featuring our Portals™ Service Menu and our unique

Find-It-In-Front: Dr. Pinball Section

DR. DR. DR. DR.

MN ME:S ENT PREV QUIT F

SEGA™ PINBALL, INC.

ADJ

TO DISABLE GRAPHIC ADULT ORIENTED SPEECH SET ADJUSTMENT 56 (ADULT SPEECH ENABLED) TO "NO".

REFER TO SECTION 3, CHAPTER 1, PORTALS SERVICE MENU INTRODUCTION FOR HELP.

PARK

§@$¿%#&+!!! dude!

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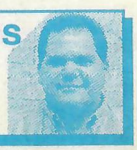

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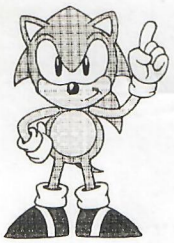
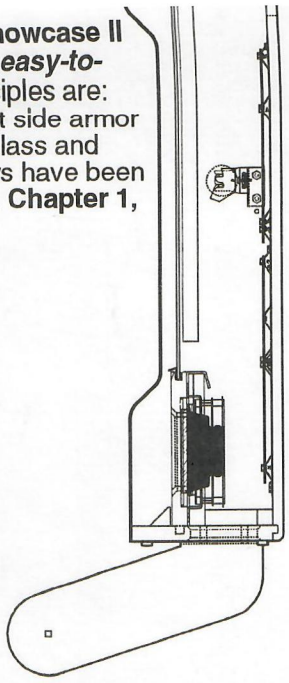
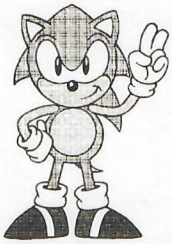
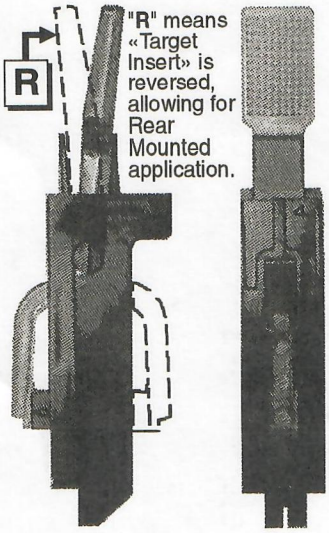


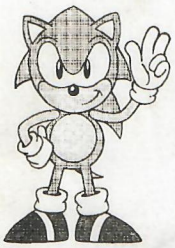
THE BACK BOX: First introduced in **Lost In Space™** Pinball is the **Sega Showcase II** Backbox! An innovative and **bold look!** A Backbox using a single lock and an ***easy-to-remove*** Back Glass & Speaker Panel / Dot Matrix Display. The operating principles are: it still folds down (using the original allen wrench key) and lays upon the cabinet side armor molding. And, you can service the PCBs from either side of the game. Back Glass and Speaker Panel / Dot Matrix Display cleaning and removal is easier. The reviews have been great, just look at your own game! For more on Backbox Parts, see **Section 4, Chapter 1, Parts Identificaiton (The Pink Pages)**.



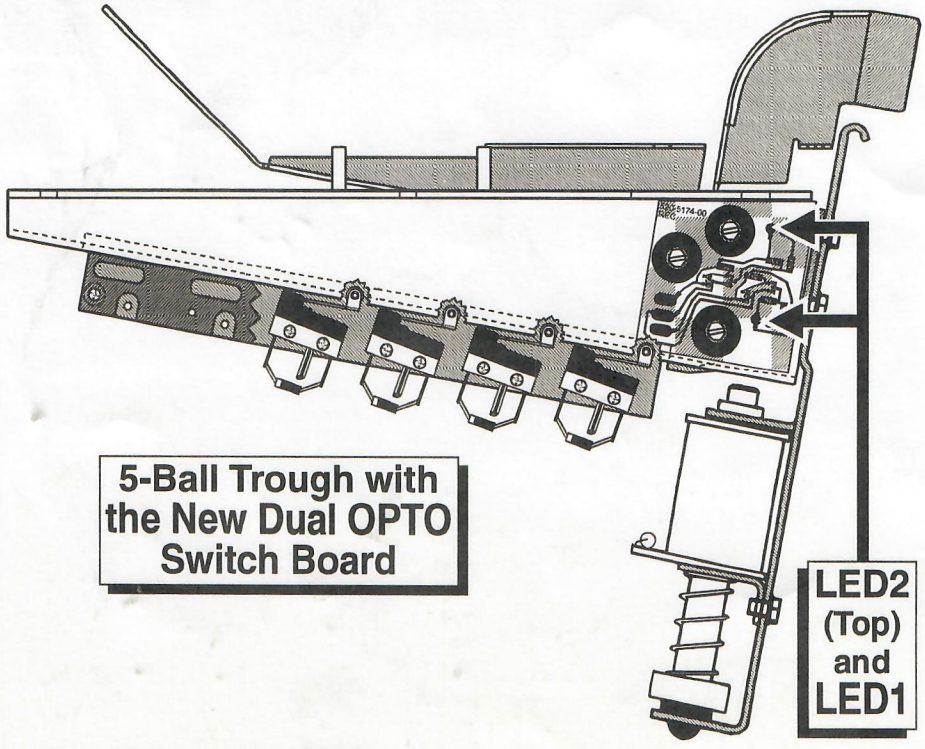


MODULAR STAND-UP TARGETS: See **Appendix I** in this manual (at the back). You can now buy just the Target Insert instead of the entire Target Assembly (if just the Target Insert is broke). Target Assemblies which are *"Rear Mounted" (reversed)* would use the same SPI Part Nº but add an "**R**" to the end. When you order the Target Insert(s) from your distributor, it should come with an *Assembly / Disassembly Instruction Sheet.* If it does not, ask your distributor for a copy of **Sega Pinball, Inc. Service Bulletin Nº 110** (or call Technical Support at below numbers). You can also use *Service Bulletin Nº 110* to reverse the Target Insert installation if you have spare "regular" mounted targets (the Switch Actuator would need to be reversed as well). **Appendix I** will give details on the Part Nºs & the Colors the targets are available in.





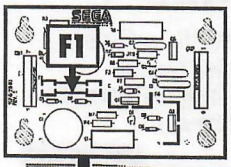
TROUGH DUAL OPTO BOARDS: We have been using **Single OPTO Switch Boards** in our Ball Troughs (as the switch for the Trough Up-Kicker) for a long while now and with great success! Through long-term field testing and design we have produced the **Dual OPTO Switch Board**. Why? Increased reliabilty and handling of the flow of pinballs in and out of the Ball Trough. In our past games **Baywatch™** through **Viper™** the Ball Trough Design used only a **Single OPTO Switch** at the Trough Up-Kicker. This designed proved itself reliable. However, as we strive continuously for improvements, we have found by using a **Dual OPTO Switch Board** it will now act as a monitoring device in the event a "double-ball" stack occurs at the Trough Up-Kicker (a double-ball stack is when a ball sits upon the top of the bottom ball over the Trough Up-Kicker). First introduced in **Lost In Space™** the **Dual OPTO Switch Board** will identify this and allow ball transition to process faster and fluently. For more on troubleshooting, see **Section 3, Chapter 2, Go To Diagnostics Menu** (then Go To Switch Menu) or **Section 5, Chapter 4, Printed Circuit Boards (PCBs), Trough Up-Kicker Dual OPTO Boards Theory of Operation & Schematic, ...Component Layout & Parts, OPTO Troubleshooting** and **Trough Dual OPTO Boards Alignment (Test for LED1 & LED2)**.



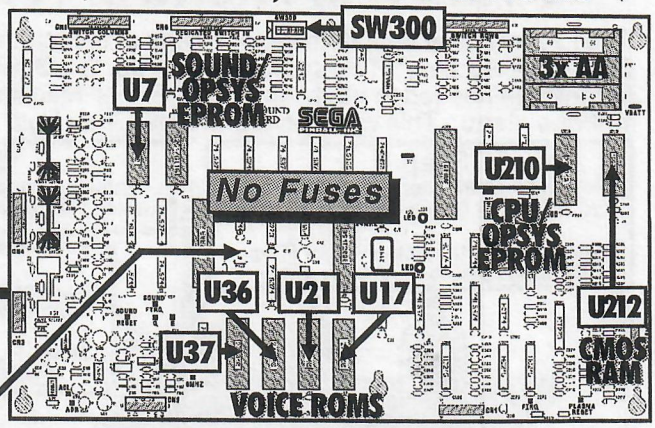
New to our Pinball Games?

Don't forget to go over **Section 3, Chapter 1, Portals™ Service Menu Introduction**. *If using Diagnostics...very useful!* And, as always, if you get stuck? Comments? Questions? Call Technical Support at 800-542-5377 or 708-345-7700.

▼ BACKBOX LAYOUT LOCATIONS: FUSES, BRIDGES, RELAYS & ROMs ▼

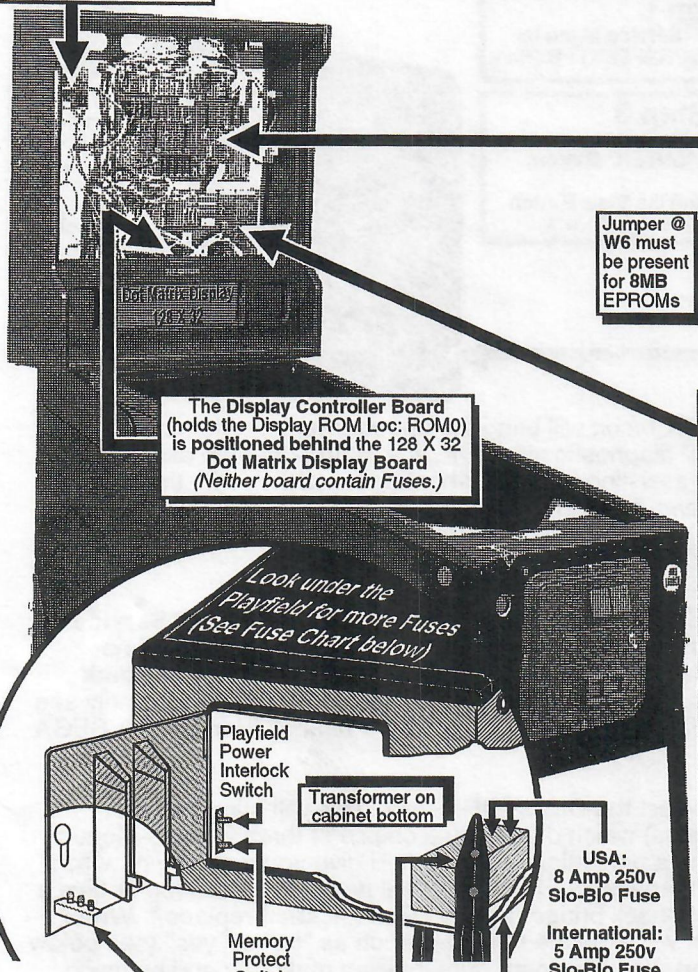


Display Power Supply Bd.



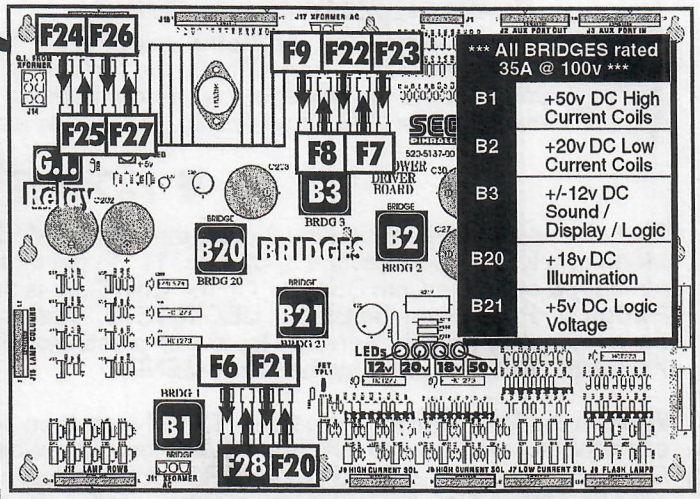
Jumper @ W6 must be present for 8MB EPROMs

CPU / Sound Board


Look under the Playfield for more Fuses (See Fuse Chart below)
Playfield Power Interlock Switch
Transformer on cabinet bottom
USA: 8 Amp 250v Slo-Blo Fuse
International: 5 Amp 250v Slo-Blo Fuse
Memory Protect Switch
Service Outlet (USA)
On/Off Switch (under cabinet)

The Display Controller Board (holds the Display ROM Loc: ROM0) **is positioned behind the 128 X 32 Dot Matrix Display Board** *(Neither board contain Fuses.)*

Volume Control & Service Switches
For operational usage, see Section 3, Chapter 1, Portals Service Menu Introduction



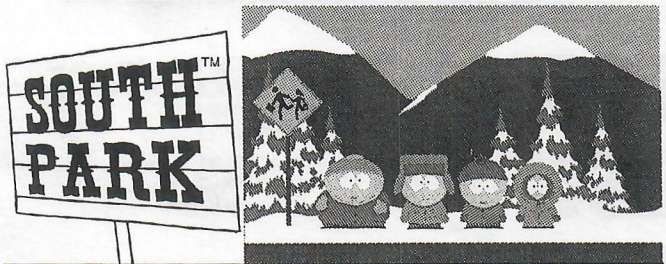
I/O Power Driver Board

CAUTION: For continued protection against risk of fire, replace only with same type of fuse having the same electrical rating!

QUICK REFERENCE FUSE CHART			
Backbox Fuses			
LOC: DISPLAY POWER SUPPLY (P.S.) BOARD			
F1	¾A 250v S.B.	90v DC	High Voltage Display
LOC: I / O POWER DRIVER BOARD			
F6	7A 250v S.B.	50v DC	Primary High Power Coils/Flippers
F7	5A 250v S.B.	20v DC	Low Power Coils
F8	5A 250v S.B.	12v DC	Logic Power
F9	5A 250v S.B.	12v DC	Logic Power
F20	3A 250v S.B.	50v DC	Not Used / Spare
F21	3A 250v S.B.	50v DC	Coils
F22	8A 250v S.B.	18v DC	Controlled Lamps
F23	4A 250v S.B.	5v DC	Logic
F24	5A 250v S.B.	6.3v AC	G.I. Lamps (BRN-WHT to WHT-BRN)
F25	5A 250v S.B.	6.3v AC	G.I. Lamps (YEL to WHT-YEL)
F26	5A 250v S.B.	6.3v AC	G.I. Lamps (GRN to WHT-GRN)
F27	5A 250v S.B.	6.3v AC	G.I. Lamps (VIO to WHT-VIO)
F28	3A 250v S.B.	24v AC	Not Used / Spare
Cabinet Fuses			
LOC: SERVICE (AC) OUTLET BOX (Cabinet Bottom)			
n/a	8A 250v S.B.	115v AC	Main Fuse Line (Domestic or USA)
n/a	5A 250v S.B.	220v AC	Main Fuse Line (International)

For Backbox & Cabinet General Parts, see Section 4, Chapter 1, Parts Identification & Location (The Pink Pages)

For Schematics and/or Component Parts on above Boards, see Sec. 5, Chp. 4, Printed Circuit Boards (PCBs) (The Yellow Pages)



QUICK REFERENCE FUSE CHART			
South Park Playfield Fuses			
LOC: UNDER PLAYFIELD (By Assemblies Listed)			
n/a	3A 250v S.B.	50v DC	Rt. Flipper (BLU-YEL↔RED-YEL)
n/a	3A 250v S.B.	50v DC	Lt. Flipper (GRY-YEL↔RED-YEL)

▼ FIND-IT-IN-FRONT: DR. PINBALL SECTION EXPLAINED ▼

The key technical data from various parts of the manual were extracted and combined into the "Find-It-In-Front: Dr. Pinball Section." This section (pages DR. ❶ - ⑩) will assist the technician in locating important technical information needed to troubleshoot the Pinball Machine. Dr. Pinball is also available on the game in the **Portals™ Service Menu**. This variation is in a Flow Chart Help Format. To get into the **Portals™ Service Menu:**

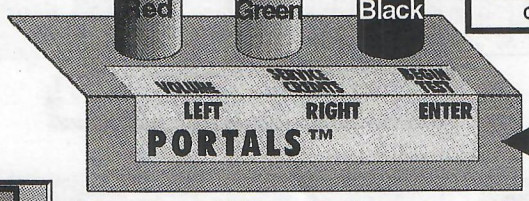
Step 2
Move through the menus by pushing the **Red "LEFT"** or **Green "RIGHT" Buttons.**

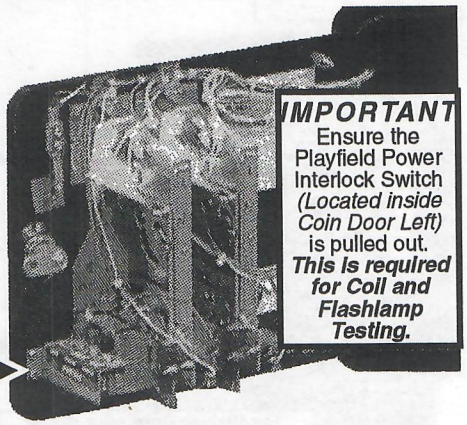
Note: Pushing the **Left** or **Right Flipper Buttons** operates in the same way.

Step 1
Enter the **Portals™ Service Menu** by pushing the **Black "BEGIN TEST" Button.**

Step 3
Select or activate icons by pushing the **Black "ENTER" Button.**

Note: Pushing the **Start Button** operates in the same way.





IMPORTANT
Ensure the Playfield Power Interlock Switch *(Located inside Coin Door Left)* is pulled out. ***This is required for Coil and Flashlamp Testing.***

In our **Portals™ Service Menu**, selecting the "DR." *Icon* will bring the operator/technician into Dr. Pinball (Flow Chart Menus), the "on-screen" diagnostic aide. This is a feature that will allow you to utilize the power of the micro-processor assisting in troubleshooting a problem with the machine in a Flow Chart format *(Just follow along & answer the questions.)*.

▼ HOW IT WORKS ▼

First, the operator/technician must enter the Service Mode (for a complete description of the **Portals™ Service Menu** and **ICONS** see Section 3, Chapter 1). To get into the Service Menu Mode: • Power-up game (if not already) & open the Coin Door. • On the Coin Door is the Portals™ Service Switch Set (**Red**, **Green** & **Black Buttons**). Push down the **Black "BEGIN TEST" Button**. Looking at the Video Display you will momentarily see the introductory screen "Service Menu" with a satellite flying from right to left pulling a banner "Portals™ © SEGA PINBALL, INC.," followed by the **MAIN MENU**.

While in the **MAIN MENU**, select the "DIAG" *Icon*, then select the Cross "DR." *Icon*. This will bring you (the operator / technician) into **DR. PINBALL** (Flow Chart Menus) which offers you a choice of three (3) Sub-Menus: Coil "DR.," Switch "DR." and Lamp "DR." *Icons*. Selecting a particular sub-menu will give you a choice of which specific Flipper, Coil, Switch or Lamp circuit needs to be diagnosed. The display will now ask a question or give a procedure to follow such as "Does the lamp turn on?" or "Check bridge rectifier BR-20, if short replace." When Dr. Pinball asks a question or request a procedure the Dr. will expect a response such as "no" or "yes" (see below examples of the *Mini-Icons* which will prompt the operator). You the operator/technician must respond by using your **Flipper Buttons** to "SELECT" a *Mini-Icon* and the **Start Button** to "ENTER" your selection.

Note: The "Portals" service switches located on the coin door can also be used to select and enter Mini-Icons. In switch test this is required since flipper and start switches are part of the test.

From the Main Menu In Portals™ GO TO DIAGNOSTICS MENU →

From the Diagnostics Menu GO TO DR. PINBALL →

From the Dr. Pinball Menu

GO TO COIL, SWITCH OR LAMP FLOW CHARTS

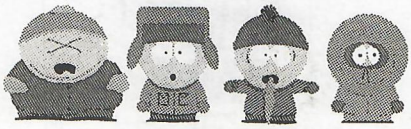
The following are the *Mini-Icons* with explanations for the Dr. Pinball Sub-Menus:

Select a Coil, Lamp, Switch or Flipper to diagnose with "-" or "+" Icon; Then select the "RUN" Icon to activate the choice.
"PREV" goes back to previous question.
"QUIT" exits Portals completely.

Seen when question is being asked on the Display. Select "YES" or "NO" to answer question given.
"END" lets you select a new item to test.

Seen when diagnosis is given.
Select any Icon for your next step.
"?" gives Help.

In Coil Flow Chart Menu, select "PULSE" to pulse the coil selected.



INSTALL 5 BALLS!

SOUTH PARK™

▼ DIAGNOSTIC AIDS ▼

The *display reads* "OPERATOR ALERT..." — A message displayed during Game Mode or Power-Up to alert the operator of a problem.

OPERATOR ALERT works by monitoring any *switch activated coil* that has the potential to trap a ball when disabled (e.g. in the Auto Launch, Scoop, Eject, etc.). If this assembly has a closed switch indicating a ball is stuck or the switch is *stuck closed*, the **CPU Board** will activate the coil ten times. If the switch remains closed, the game will display a message indicating there is a problem (e.g. "**OPERATOR ALERT AUTO LAUNCH NOT WORKING**"). This not only warns the operator of a problem immediately, but indicates exactly where the operator should look to resolve it.

The *display flashes* "OPEN THE COIN DOOR" — This indicates that CMOS RAM memory (CPU Loc. U212) has been corrupted.

This is caused by either failure in memory (e.g. batteries are dead or faulty **RAM**) or upon installation of updated version of code. Opening the Coin Door will initiate a Factory Restore, by opening the Memory Protect Switch. Check battery voltage at **CMOS RAM** with power off.

▼ CPU DIP SWITCH SETTINGS, LOC. SW300 CPU/SOUND BOARD ▼

CUSTOM FACTORY ADJUSTMENTS BY COUNTRY*

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
USA *	ON								
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
AUSTRIA	ON	▲							
	OFF		▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
BELGIUM	ON		▲						
	OFF	▼		▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
BRAZIL	ON	▲		▲	▲				
	OFF		▼			▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
CANADA	ON	▲	▲						
	OFF			▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
FRANCE	ON		▲	▲					
	OFF	▼			▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
GERMANY	ON	▲	▲	▲					
	OFF				▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
ITALY	ON				▲				
	OFF	▼	▼	▼		▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
JAPAN	ON	▲			▲				
	OFF		▼	▼		▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
NETHERLANDS (HOLLAND / DUTCH)	ON			▲					
	OFF	▼	▼		▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
NORWAY	ON		▲		▲				
	OFF	▼		▼		▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
SWEDEN	ON	▲	▲		▲				
	OFF			▼		▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
SWITZERLAND	ON			▲	▲				
	OFF	▼	▼			▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
UK	ON	▲		▲					
	OFF		▼		▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
UK FOR NEW 50p, 2£ COIN MECH	ON		▲	▲	▲				
	OFF	▼				▼	▼	▼	▼

***All countries not noted use the "USA Setting"**

▼ ROM SUMMARY TABLE ▼

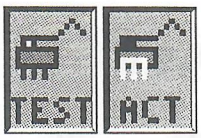
* ***Note:*** The CPU/Sound Board must ***have a*** Jumper at W6 ***to accept*** 8MB ROMs.

I.C. NAME	TYPE	BOARD NAME	LOC.	PART N8
Game ROM	1MB	CPU / Sound Board	U210	965-0301-71
Voice ROM 1 *	8MB	CPU / Sound Board	U17	965-0302-71
Voice ROM 2 *	8MB	CPU / Sound Board	U21	965-0303-71
Voice ROM 3 *	8MB	CPU / Sound Board	U36	965-0304-71
Voice ROM 4 *	8MB	CPU / Sound Board	U37	965-0305-71
Sound EPROM	512K	CPU / Sound Board	U7	965-0306-71

Display EPROM	4MB	Display Controller Bd.	ROM 0	965-0307-71
Display EPROM	Not Used	Display Controller Bd.	ROM 1	Not Used

From the Main Menu In Portals™ GO TO DIAGNOSTICS MENU →

From the Diagnostics Menu GO TO SWITCH MENU →



From the Switch Menu GO TO SWITCH OR ACTIVE SWITCH TEST →

From the Switch Menu GO TO DEDICATED SWITCH TEST

SWITCH MATRIX GRID & DEDICATED SWITCHES

Diode On Terminal Strip

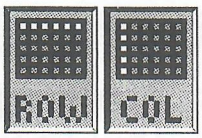
Column (Drive) / Row (Return)	1: Q1 GRN-BRN CN5-P1	2: Q2 GRN-RED CN5-P3	3: Q3 GRN-ORG CN5-P4	4: Q4 GRN-YEL CN5-P5	5: Q5 GRN-BLK CN5-P6	6: Q6 GRN-BLU CN5-P7	7: Q7 GRN-VIO CN5-P8	8: Q8 GRN-GRY CN5-P9
1: U400 WHT-BRN CN7-P9	LEFT BUTTON (UK ONLY) on Cabinet side 1	NOT USED 9	LEFT 5-BANK BOTTOM Under P/F 17	RIGHT RAMP ENTER Above P/F 25	NOT USED 33	NOT USED 41	LEFT TURBO BUMPER Under P/F 49	LEFT OUTLANE Under P/F 57
2: U400 WHT-RED CN7-P8	4TH COIN SLOT On Coin Door 2	5-BALL TROUGH #1 (LEFT) Under P/F 10	LEFT 5-BANK #2 Under P/F 18	RIGHT RAMP EXIT Above P/F 26	RIGHT 3-BANK BOTTOM Under P/F 34	KENNY OPTO Under P/F 42	RIGHT TURBO BUMPER Under P/F 50	LEFT RETURN LANE Under P/F 58
3: U400 WHT-ORG CN7-P7	6TH COIN SLOT On Coin Door 3	5-BALL TROUGH #2 Under P/F 11	LEFT 5-BANK #3 Under P/F 19	NOT USED 27	RIGHT 3-BANK MIDDLE Under P/F 35	UNDER-TROUGH (TOILET) Under P/F 43	BOTTOM TURBO BUMPER Under P/F 51	LEFT SLINGSHOT Under P/F 59
4: U400 WHT-YEL CN7-P6	RIGHT COIN SLOT On Coin Door 4	5-BALL TROUGH #3 Under P/F 12	LEFT 5-BANK #4 Under P/F 20	NOT USED 28	RIGHT 3-BANK TOP Under P/F 36	UNDER-TROUGH (KENNY) Under P/F 44	NOT USED 52	RIGHT OUTLANE Under P/F 60
5: U401 WHT-GRN CN7-P5	CENTER COIN SLOT / DBA On Coin Door 5	5-BALL TROUGH #4 Under P/F 13	LEFT 5-BANK TOP Under P/F 21	NOT USED 29	POP BUMPER TARGET LT Under P/F 37	SVUK Under P/F DOTS 45	NOT USED 53	RIGHT RETURN LANE Under P/F 61
6: U401 WHT-BLU CN7-P3	LEFT COIN SLOT On Coin Door 6	5-BALL TROUGH VUK OPTO Under P/F 14	CENTER 3-BANK LEFT Under P/F 22	NOT USED 30	POP BUMPER TARGET RT Under P/F 38	VUK Under P/F DOTS 46	START BUTTON Cabinet Front 54	RIGHT SLINGSHOT Under P/F 62
7: U401 WHT-VIO CN7-P2	5TH COIN SLOT On Coin Door 7	5-BALL STACKING OPTO Under P/F 15	CENTER 3-BANK MIDDLE Under P/F 23	NOT USED 31	NOT USED 39	LEFT ORBIT (TO VUK) Under P/F 47	SLAM TILT On Coin Door 55	NOT USED 63
8: U401 WHT-GRY CN7-P1	RIGHT BUTTON (UK ONLY) on Cabinet side 8	SHOOTER LANE Under P/F DOTS 16	CENTER 3-BANK RIGHT Under P/F 24	NOT USED 32	NOT USED 40	UNDER-TROUGH SVUK Under P/F 48	PLUMB BOB TILT Inside Cabinet 56	NOT USED 64

GND / IC U206 INPUTS	Ground BLK CN6-P1, -P11
1: U206 GRY-BRN CN6-P2	#1 LEFT FLIPPER BUTTON in Cabinet side DS-1
2: U206 GRY-RED CN6-P3	#2 LEFT FLIPPER E.O.S (End-of-Stroke) in Cabinet side DS-2
3: U206 GRY-ORG CN6-P4	#3 RIGHT FLIPPER BUTTON in Cabinet side DS-3
4: U206 GRY-YEL CN6-P5	#4 RIGHT FLIPPER E.O.S. (End-of-Stroke) in Cabinet side DS-4
5: U206 NOT USED GRY-GRN CN6-P7	NOT USED DS-5
6: U206 GRY-BLU CN6-P8	#6 VOLUME (RED BUTTON) (In Test: LEFT) on Coin Door DS-6
7: U206 GRY-VIO CN6-P9	#7 SERV. CRED. (GREEN BUTTON) (In Test: RIGHT) on Coin Door DS-7
8: U206 GRY-BLK CN6-P10	#8 BEGIN TEST (BLACK BUTTON) (In Test: ENTER) on Coin Door DS-8

From the Diagnostics Menu GO TO LAMP MENU →

From the Lamp Menu GO TO SINGLE LAMP TEST →

From the Lamp Menu GO TO TEST ALL LAMPS →

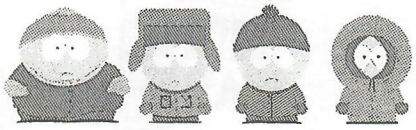


From the Lamp Menu GO TO ROW OR COLUMN TEST

LAMP MATRIX GRID

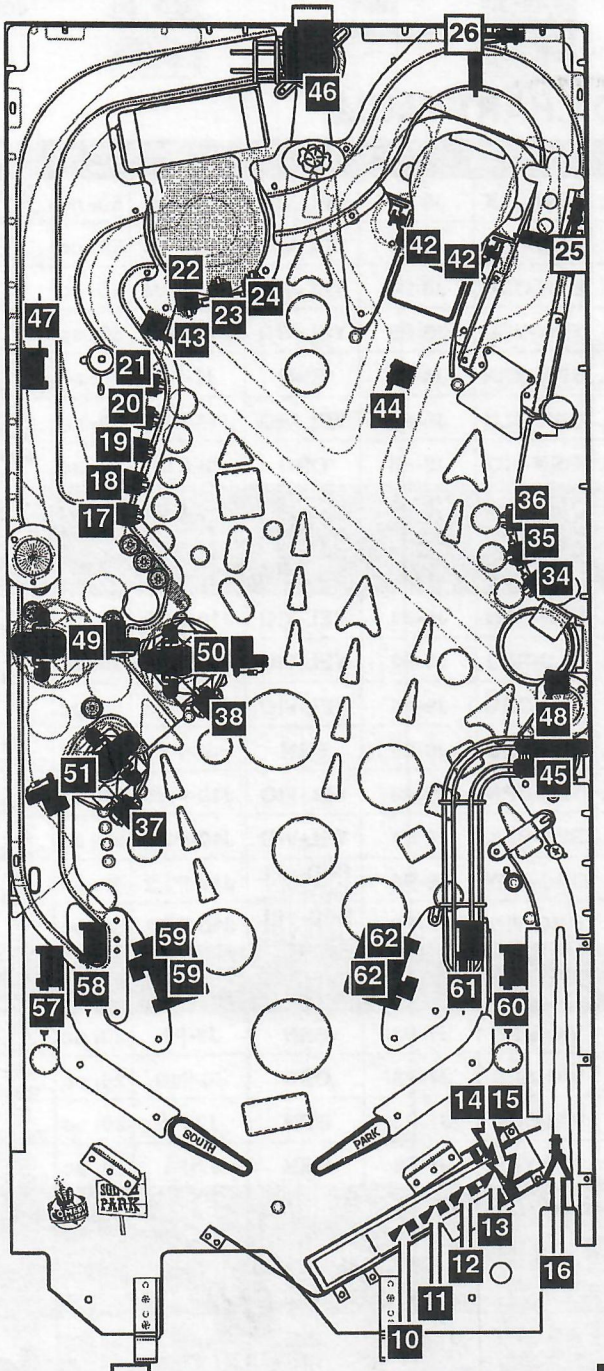
Diode On Terminal Strip

Column (18v) / Row (GND)	1: U17 YEL-BRN J13-P9	2: U16 YEL-RED J13-P8	3: U15 YEL-ORG J13-P7	4: U14 YEL-BLK J13-P6	5: U13 YEL-GRN J13-P5	6: U12 YEL-BLU J13-P4	7: U11 YEL-VIO J13-P3	8: U10 YEL-GRY J13-P1
1: Q33 RED-BRN J12-P1	CHEF FACE #555 Bulb 1	CHEF #2 #555 Bulb 2	CHEF #3 #555 Bulb 3	CHEF #4 #555 Bulb 4	CHEF ARROW #555 Bulb 5	MYSTERY #555 Bulb 6	SPOOKY VISION #555 Bulb 7	EXTRA BALL #555 Bulb 8
2: Q34 RED-BLK J12-P2	STAN FACE #555 Bulb 9	STAN #2 #555 Bulb 10	STAN #3 #555 Bulb 11	STAN #4 #555 Bulb 12	STAN ARROW #555 Bulb 13	SKILL SHOT #555 Bulb 14	VOLCANO #555 Bulb 15	ANAL PROBE #555 Bulb 16
3: Q35 RED-ORG J12-P3	KENNY FACE #555 Bulb 17	KENNY #2 #555 Bulb 18	KENNY #3 #555 Bulb 19	KENNY #4 #555 Bulb 20	KENNY ARROW #555 Bulb 21	SUPER JACKPOT #555 Bulb DOTS 22	MULTIBALL READY 555# ulb DOTS 23	SOUTH PARK SIGN #555 Bulb 24
4: Q36 RED-YEL J12-P4	KYLE FACE #555 Bulb 25	KYLE #2 #555 Bulb 26	KYLE #3 #555 Bulb 27	KYLE #4 #555 Bulb 28	KYLE ARROW #555 Bulb 29	KENNY ASSEMBLY #555 Bulb DOTS 30	NOT USED 31	NOT USED 32
5: Q37 RED-GRN J12-P5	CARTMAN FACE #555 Bulb 33	CARTMAN #2 #555 Bulb 34	CARTMAN #3 #555 Bulb 35	CARTMAN #4 #555 Bulb 36	CARTMAN ARROW #555 Bulb 37	LEFT TUR-BO BUMPER 555# Bulb DOTS 38	RIGHT TUR-BO BUMPER 555# Bulb DOTS 39	BTTM TUR-BO BUMPER 555# Bulb DOTS 40
6: Q38 RED-BLU J12-P6	LEFT 5-BANK BOTTOM #555 Bulb 41	LEFT 5-BANK #2 #555 Bulb 42	LEFT 5-BANK #3 #555 Bulb 43	LEFT 5-BANK #4 #555 Bulb 44	LEFT 5-BANK TOP #555 Bulb 45	TOILET S-U LT #555 Bulb DOTS 46	NOT USED 47	TOILET S-U RT #555 Bulb DOTS 48
7: Q39 RED-VIO J12-P8	NOT USED 49	RT. 3-BANK BOTTOM #555 Bulb 50	RT. 3-BANK MIDDLE #555 Bulb 51	RT. 3-BANK TOP #555 Bulb 52	LEFT OUTLANE #555 Bulb 53	LEFT RE-TURN LANE #555 Bulb 54	RIGHT RE-TURN LANE #555 Bulb 55	RIGHT OUTLANE #555 Bulb 56
8: Q40 RED-GRY J12-P9	MR. HANKEY: BOTTOM #555 Bulb 57	MR. HANKEY: BODY #555 Bulb 58	MR. HANKEY: LT HAND #555 Bulb 59	MR. HANKEY: RT HAND #555 Bulb 60	MR. HANKEY: HEAD #555 Bulb 61	MR. HANKEY: HAT #555 Bulb 62	POP BUMPER TARGET LT #555 Bulb 63	POP BUMPER TARGET RT #555 Bulb 64
9: Q41 NOT USED RED-WHT J12-P10	NOT USED 65	NOT USED 66	NOT USED 67	NOT USED 68	NOT USED 69	NOT USED 70	NOT USED 71	NOT USED 72
10: Q42 NOT USED RED J12-P11	NOT USED 73	NOT USED 74	NOT USED 75	NOT USED 76	NOT USED 77	NOT USED 78	NOT USED 79	NOT USED 80

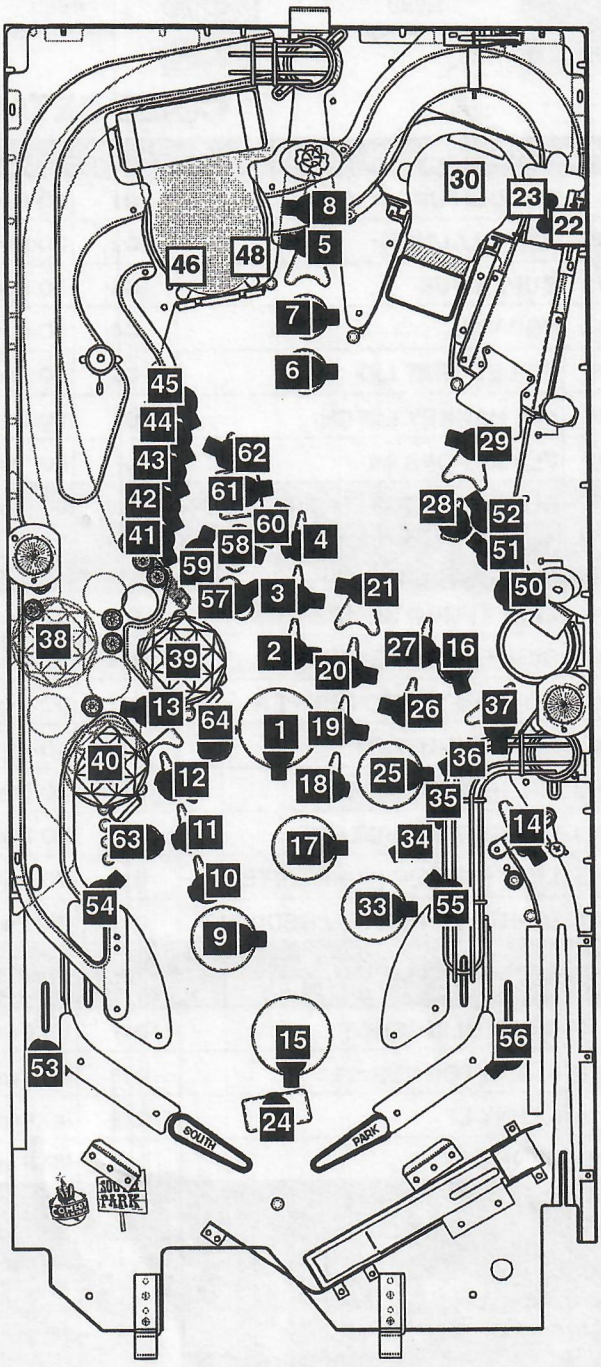


Find-It-In-Front: Dr. Pinball

SWITCH MATRIX GRID LOCATIONS

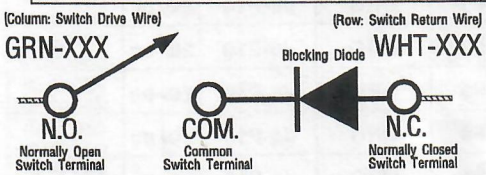


LAMP MATRIX GRID LOCATIONS

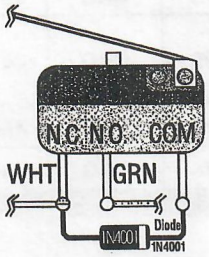


Legend Note: ☐ = Switches/Lamps mounted above playfield. ■ = Switches/Lamps mounted below the playfield.

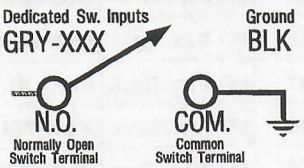
TYPICAL SWITCH SCHEMATIC



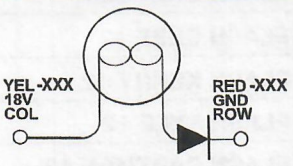
Note:
All Switches require diodes.
Some diodes are located on Terminal Strips (under playfield) & not on the switch itself.
Diode
On
Terminal
Strip



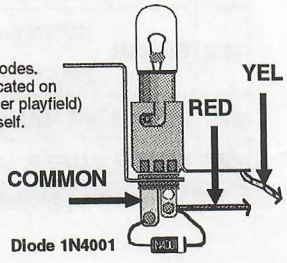
DEDICATED SWITCH SCHEMATIC



TYPICAL LAMP SCHEMATIC



Note:
All Lamps require diodes.
Some diodes are located on Terminal Strips (under playfield) & not on the lamp itself.
Diode
On
Terminal
Strip



DR. Find-It-In-Front: Dr. Pinball

SOUTH PARK™

From the Main Menu in Portals™ GO TO DIAGNOSTICS MENU →

From the Diagnostics Menu GO TO COIL MENU →

From the Coil Menu GO TO COIL TEST →

From the Coil Menu GO TO CYCLING COILS

COILS DETAILED CHART TABLE

High Current Coils Group 1		Drive Transistor (D.T.)	Driver Ouput Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connnection	Power Voltage	Coil GA/Turn or Bulb Type
#1	TROUGH UP-KICKER	Q1	I/O Pwr. Drvr.	BRN-BLK	J8-P1	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#2	AUTO LAUNCH	Q2	I/O Pwr. Drvr.	BRN-RED	J8-P3	YEL-VIO	J10-P4/5	50v DC	24-940 090-5036-00T
#3	SUPER VUK	Q3	I/O Pwr. Drvr.	BRN-ORG	J8-P4	YEL-VIO	J10-P4/5	50v DC	24-940 090-5036-00T
#4	TOP VUK	Q4	I/O Pwr. Drvr.	BRY-YEL	J8-P5	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#5	TOILET SEAT LID	Q5	I/O Pwr. Drvr.	BRN-GRN	J8-P6	BRN	J7-P1	20v DC	23-1100 090-5030-00T
#6	MR. HANKEY LATCH	Q6	I/O Pwr. Drvr.	BRN-BLU	J8-P7	YEL-VIO	J10-P4/5	50v DC	29-1000 090-5059-00
#7	FLASH POPS ⁎4	Q7	I/O Pwr. Drvr.	BRN-VIO	J8-P8	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#8	EUROPEAN TOKEN DISPENSER	Q8	I/O Pwr. Drvr.	BRN-GRY	J8-P9	YEL-VIO	J10-P4/5	50v DC	DL4SS 515-6076-01

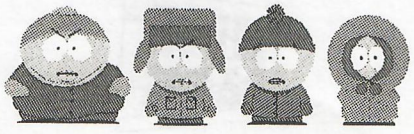
High Current Coils Group 2		Drive Transistor (D.T.)	Driver Ouput Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connnection	Power Voltage	Coil GA/Turn
#9	LEFT TURBO BUMPER	Q9	I/O Pwr. Drvr.	BLU-BRN	J9-P1	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#10	RIGHT TURBO BUMPER	Q10	I/O Pwr. Drvr.	BLU-RED	J9-P2	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#11	BOTTOM TURBO BUMPER	Q11	I/O Pwr. Drvr.	BLU-ORG	J9-P4	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#12	LEFT SLINGSHOT	Q12	I/O Pwr. Drvr.	BLU-YEL	J9-P5	BRN	J7-P1	20v DC	23-800 090-5001-00T
#13	MR. HANKEY (DOWN)	Q13	I/O Pwr. Drvr.	BLU-GRN	J9-P6	YEL-VIO	J10-P4/5	50v DC	23-1100 090-5030-00T
#14	KENNY PIVOT (DEAD)	Q14	I/O Pwr. Drvr.	BLU-BLK	J9-P7	YEL-VIO	J10-P4/5	50v DC	22-1080 090-5032-00T
#15	LEFT FLIPPER (50v RED/YEL)	Q15	I/O Pwr. Drvr.	ORG-GRY	J9-P8	RED-YEL GRY-YEL	J10-P1/2	50v DC	23-1100 090-5030-00T
#16	RIGHT FLIPPER (50v RED/YEL)	Q16	I/O Pwr. Drvr.	ORG-VIO	J9-P9	RED-YEL BLU-YEL	J10-P1/2	50v DC	23-1100 090-5030-00T

Low Current Coils Group 1		Drive Transistor (D.T.)	Driver Ouput Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connnection	Power Voltage	Coil GA/Turn Bulb or Meter
#17	RIGHT SLINGSHOT	Q17	I/O Pwr. Drvr.	VIO-BRN	J7-P2	BRN	J7-P1	20v DC	23-800 090-5001-00T
#18	FLASH TOP VUK ⁎1	Q18	I/O Pwr. Drvr.	VIO-RED	J7-P3	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#19	KENNY LT	Q19	I/O Pwr. Drvr.	VIO-ORG	J7-P4	BRN	J7-P1	20v DC	24-940 090-5036-00T
#20	KENNY RT	Q20	I/O Pwr. Drvr.	VIO-YEL	J7-P6	BRN	J7-P1	20v DC	24-940 090-5036-00T
#21	LT OUTLANE (UK ONLY)	Q21	I/O Pwr. Drvr.	VIO-GRN	J7-P7	BRN	J7-P1	20v DC	28-1050 090-5046-00
#22	RT OUTLANE (UK ONLY)	Q22	I/O Pwr. Drvr.	VIO-BLU	J7-P8	BRN	J7-P1	20v DC	28-1050 090-5046-00
#23	UP/DOWN POST (UK ONLY)	Q23	I/O Pwr. Drvr.	VIO-BLK	J7-P9	BRN	J7-P1	20v DC	23-1100 090-5030-00T
#24	OPTIONAL COIN METER	Q24	I/O Pwr. Drvr.	VIO-GRY	J7-P10	RED	J16-P7	5v DC	Meter 5v 091-5000-00

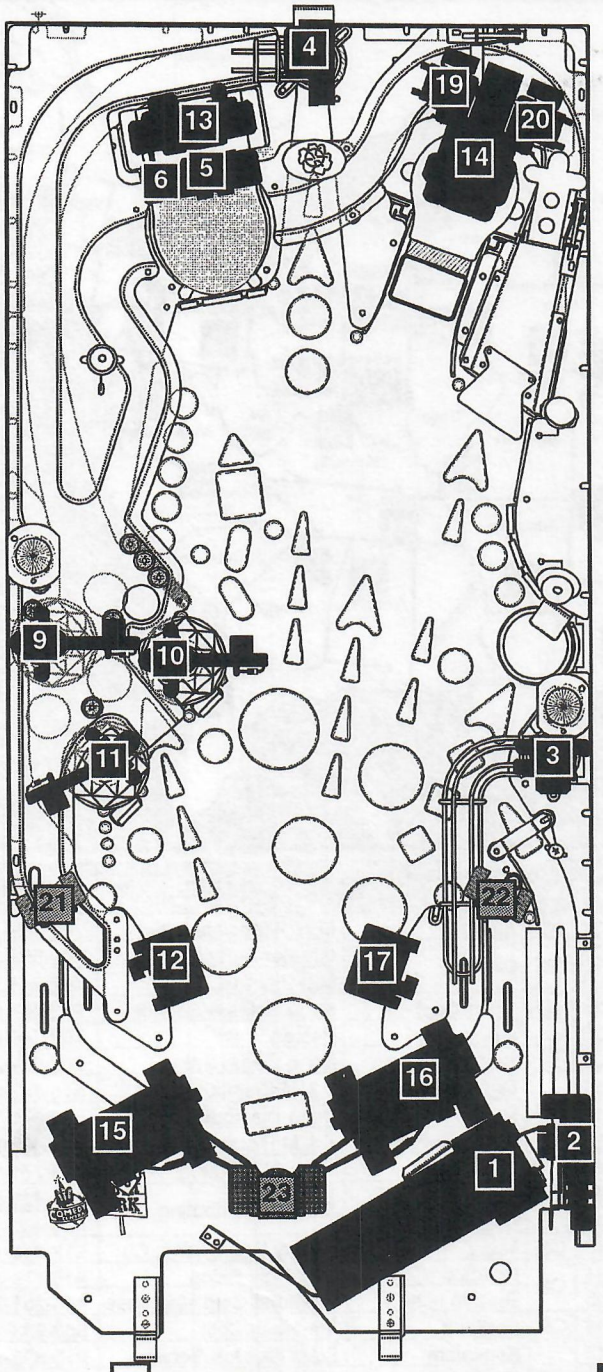
D iode O n T erminal S trip (if noted)

Flash Lamps (FLASH)		Drive Transistor (D.T.)	Driver Ouput Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connnection	Power Voltage	Bulb Type
#F1	FLASH STAN ⁎2	Q25	I/O Pwr. Drvr.	BLK-BRN	J6-P1	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#F2	FLASH CHEF ⁎2	Q26	I/O Pwr. Drvr.	BLK-RED	J6-P2	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#F3	FLASH KENNY ⁎2	Q27	I/O Pwr. Drvr.	BLK-ORG	J6-P3	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#F4	FLASH KYLE ⁎2	Q28	I/O Pwr. Drvr.	BLK-YEL	J6-P4	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#F5	FLASH CARTMAN ⁎2	Q29	I/O Pwr. Drvr.	BLK-GRN	J6-P5	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#F6	FLASH KENNY ⁎1 BACK ⁎2	Q30	I/O Pwr. Drvr.	BLK-BLU	J6-P6	ORG	J6-P10	20v DC	#906 Bulb 165-5004-00 / #89 Bulb 165-5000-89
#F7	FLASH MR HANKEY/TOILET ⁎2	Q31	I/O Pwr. Drvr.	BLK-VIO	J6-P7	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#F8	FLASH SUPER VUK ⁎1	Q32	I/O Pwr. Drvr.	BLK-GRY	J6-P8	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89

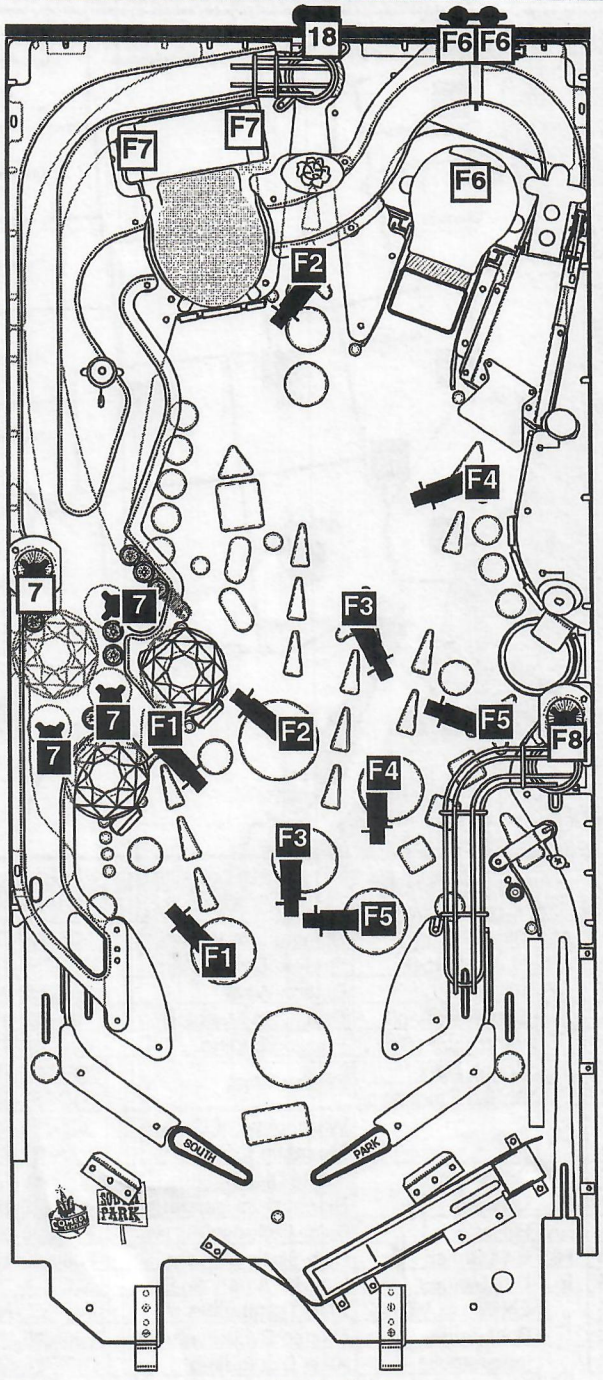
Note: In Test Flash Lamps Menu ("Flash" Icon), Flashers tested are Flash Lamps F1-F8 ONLY. Test all others in Single or Cycling Coil Tests.



COIL LOCATIONS

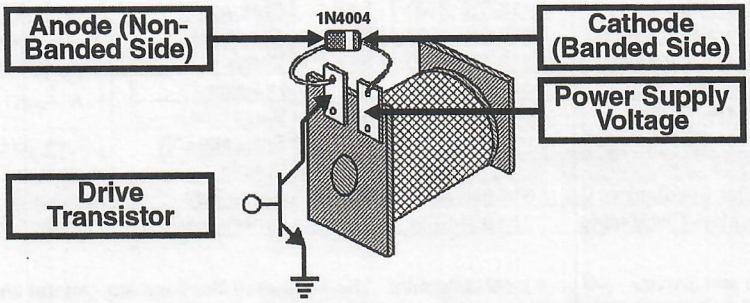


FLASH LAMP LOCATIONS



Legend Note: □ = Coils/Flashes mounted above playfield. ■ = Coils/Flashes mounted below the playfield.

TYPICAL COIL WIRING

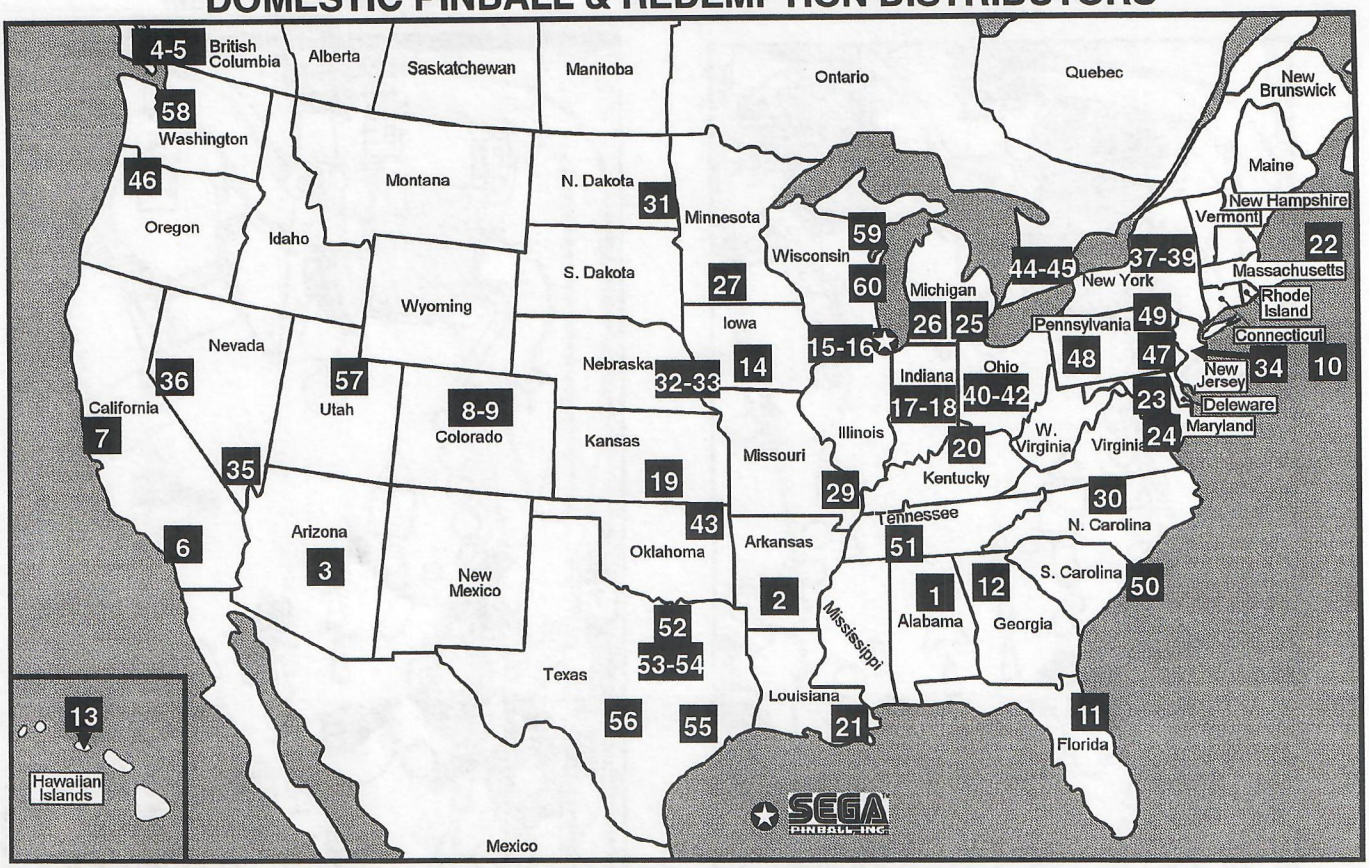


Note:
All Coils require diodes. Some diodes are located on Terminal Strips (under playfield) & not on the coil itself.
D iode
O n
T erminal
S trip

Find-It-In-Front:
Dr. Pinball

SOUTH PARK™

DOMESTIC PINBALL & REDEMPTION DISTRIBUTORS



#	STATE/PROVINCE AND CITY		NAME	PHONE
1	AL	Birmingham	Birmingham Vending	205-324-7526
2	AR	N. Little Rock	Godwin Distributing	501-753-1138
3	AZ	Phoenix	Betson West	602-233-0190
4	BC	Burnaby (Can.)	Can. Coin Machine	604-420-4008
5		Vancouver (Can.)	Pacific Vending	604-324-2164
6	CA	Buena Park	Betson West	714-228-7500
7		S. San Francisco		415-952-4220
8	CO	Denver	Warehouse of Games	303-893-8652
9			Mountain Coin	303-427-2133
10	CT	Williamantic	T & M Distributing	860-456-4231
11	FL	Orlando	Birmingham Vending	407-425-1505
12	GA	Roswell	Game Exchange/SE, Inc.	770-594-0000
13	HI	Ewa Beach	50th State Coin Op.	808-682-4561
14	IA	Des Moines	Greater American Dist.	515-244-2828
15	IL	Elk Grove Village	Atlas Distributing	847-952-7500
16		Bensenville	Namco Cybertainment	630-238-2200
17	IN	Indianapolis	Atlas Distributing	317-786-6892
18		Indianapolis	Shaffer Distributing, Co.	317-899-2530
19	KS	Wichita	United Distributors, Inc.	316-263-6181
20	KY	Louisville	Atlas Distributing	502-966-5266
21	LA	Metairie	AMA Distributors, Inc.	504-835-3232
22	MA	E. Long Meadow	Gekay Sales	413-525-2700
23	MD	Baltimore	Automated Services	410-646-4100
24			Weiner Distributing	410-525-2600
25	MI	Redford	Atlas Distributing	313-794-4880
26		Wyoming	Atlas Distributing	616-241-1472
27	MN	Bloomington	Hanson Distributing	612-884-6604
28				
29	MO	St. Louis	Shaffer Distributing, Co.	314-645-3393
30	NC	Archdal	Operators Distributing	910-884-5714

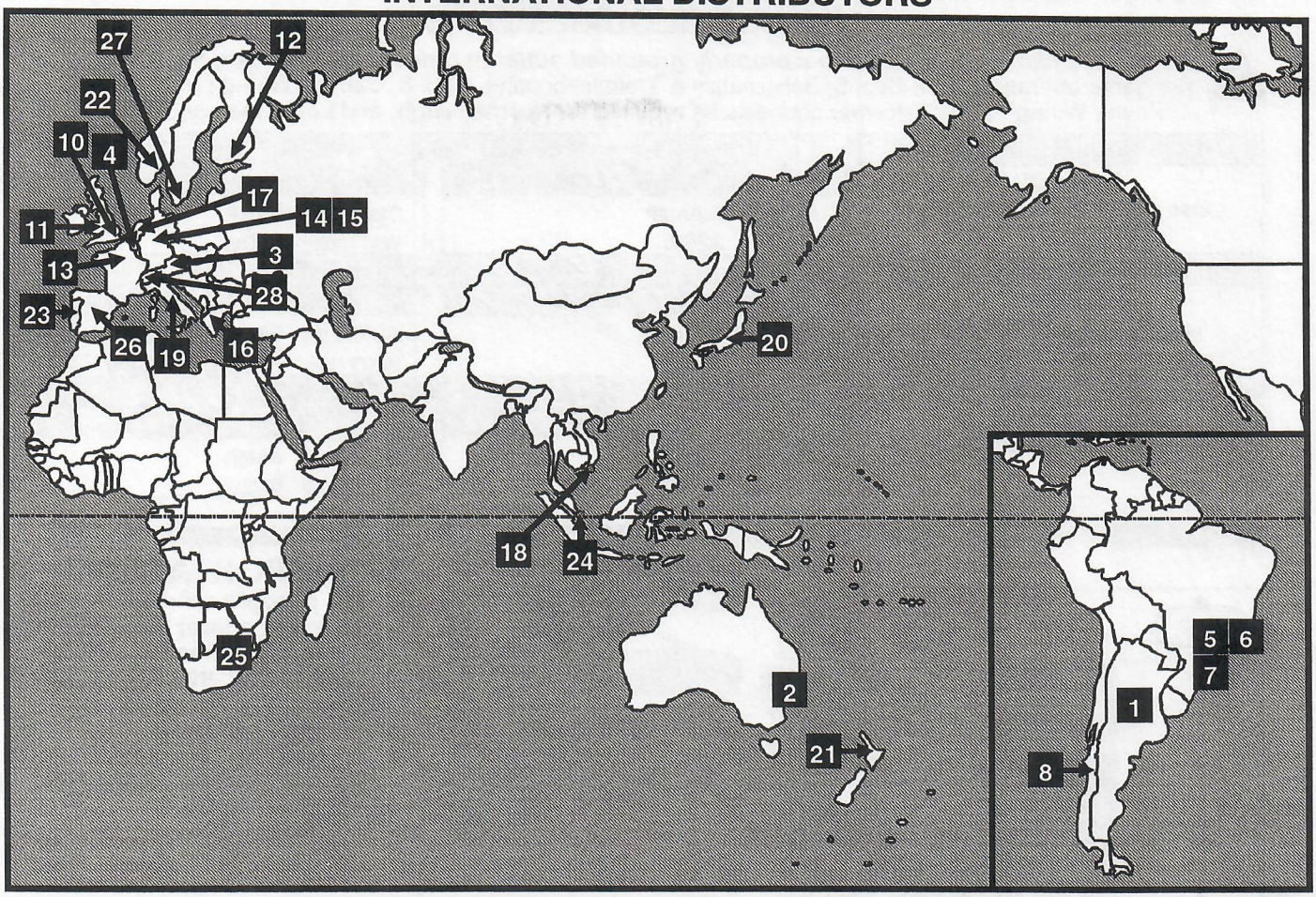
#	STATE/PROVINCE AND CITY		NAME	PHONE
31	ND	Fargo	M.H. Associates, Inc.	701-282-7877
32	NE	Omaha	Greater American Dist.	402-553-2812
33			Mid-City Dist.	402-341-5300
34	NJ	Springfield	State Sales & Service	973-467-9700
35	NV	Las Vegas	Betson West	702-740-8484
36		Reno	Reno Game Sales	702-829-2080
37	NY	Garden City Park	T & M Distributing	516-747-0034
38		Roslyn Heights	Deith Distributing	516-621-1234
39		Syracuse	T & M Distributing	315-432-1932
40	OH	Cincinnati	Atlas Distributing	513-771-1909
41		Columbus	Shaffer Distributing, Co.	614-421-6800
42		Macedonia		330-467-4850
43	OK	Tulsa	Galaxy Distributing, Co.	918-835-1166
44	ON	Rexdale (Can.)	New Way Sales	416-674-8000
45		Toronto (Can.)	Starburst Coin Machines	416-251-2122
46	OR	Portland	American Coin	503-233-7000
47	PA	Bensalem	State Sales & Service	215-638-1122
48		Pittsburgh	Green Coin	412-881-8804
49		Wilkes-Barre	Superior	717-824-9994
50	SC	Mrytle Beach	Green Coin	803-629-1900
51	TN	Memphis	Green G.A.M.E.S.	901-353-1000
52	TX	Carrolton	Nickels & Dimes	972-492-3262
53		Corsicana	Master Sales	903-874-4740
54		Dallas	Commercial Music	214-741-6381
55		Houston	H.A. Franz, & Co.	713-523-7366
56		San Antonio		210-226-6322
57	UT	Salt Lake City	Struve Distributing	801-328-1636
58	WA	Seattle	American Coin	206-764-9020
59	WI	Green Bay	Pioneer Sales & Svc.	920-468-5200
60		Menomonee Falls	Pioneer Sales & Svc.	414-781-1420

PARTS SALES & TECHNICAL SUPPORT
SEGA PINBALL, INC.

For Parts and Service, call your local distributor. The numbered locations are general areas. View table and map for corresponding numbered distributor. If your state/province does not have a distributor, call the nearest state/province. Distributors and phone numbers are subject to change. Call Sega Pinball, Inc. Technical Support with any questions or if your distributor cannot help you, at **1-800-542-5377** (USA or Canada or elsewhere at 1-708-345-7700).

Find-It-In-Front:
Dr. Pinball DR.

INTERNATIONAL DISTRIBUTORS



#	COUNTRY AND CITY	NAME	PHONE (-011)
1	Argentia, Urquiza	*Florencia	54-232-5532
2	Australia, Matraville	Amusement Mach. Dist.	61-29-316-6000
3	Austria, Grazerstrasse	Rupp Austria	43-34-528-6105
4	Belgium, Brussels	Splin S.A.	32-43-62-7677
5	Brazil, Sao Paulo	Parkland	55-11-792-42864
6		Unimax	55-11-533-5615
7		Universe	55-11-575-0731
8	Chile, Santiago	Cuinsa	56-2-696-0167
9		Universe Electronics	56-2-235-7822
10	England, London	Electrocoin	44-181-965-2055
11	So. Wales, Cardiff	Electrocoin	44-22-261-5100
12	Finland, Espoo	Pelika Ray Oy	35-8-943-7091
13	France, Aubervilliers	PLF Sa	33-14-811-3131
14	Germany, Berlin	Bally Wulff	49-3-062-0020

#	COUNTRY AND CITY	NAME	PHONE (-011)
15	Germany, Hannover	Bally Wulff	49-511-358-5343
16	Greece, Athens	Greece Coin	30-1-554-1608
17	Holland, 's-Hertogenbosch	Érrel Industries	31-73-645-6111
18	Hong Kong, Kwai Fong	Bondeal Limited	85-2-487-9089
19	Italy (RSM), Serravalle	Technoplay Sa	39-54-990-0361
20	Japan, Tokyo	Data East, Corp.	81-35-370-0708
21	New Zealand, Auckland	Amco Machine Supp.	64-9-846-7606
22	Norway, Oslo	Vendcomatic	47-2-216-0830
23	Portugal, Amadora	Jacinto & Martins	35-11-495-1868
24	Singapore, Singapore	Valibel Technologies	65-748-8404
25	South Africa, Lalucia	Unimac	27-3-152-5544
26	Spain, Madrid	Sente S.A.	34-1-541-7112
27	Sweden, Malmo	Truemax AB	46-40-153-635
28	Switzerland, Harkingen	Novomat Ag	41-62-398-4061

PARTS SALES & TECHNICAL SUPPORT
SEGA PINBALL, INC.

For Parts and Service, call your local distributor. The numbered locations are general areas. View table and map for corresponding numbered distributor. If your country does not have a distributor, call the nearest country. Distributors and phone numbers are subject to change. Call Sega Pinball, Inc. Technical Support with any questions or if your distributor cannot help you, at **1-708-345-7700.**

DR. Dr. Pinball
Find-It-In-Front:

SOUTH PARK™

POWER REQUIREMENTS

This game ***must be connected to a properly grounded outlet to reduce shock hazard*** & insure proper game operation. See Sec. 5, Schematics & Troubleshooting, Chp. 3, Cabinet Wiring (Transformer Power Wiring), for transformer connections required for **Normal**, **High**, and **Low Line** conditions.

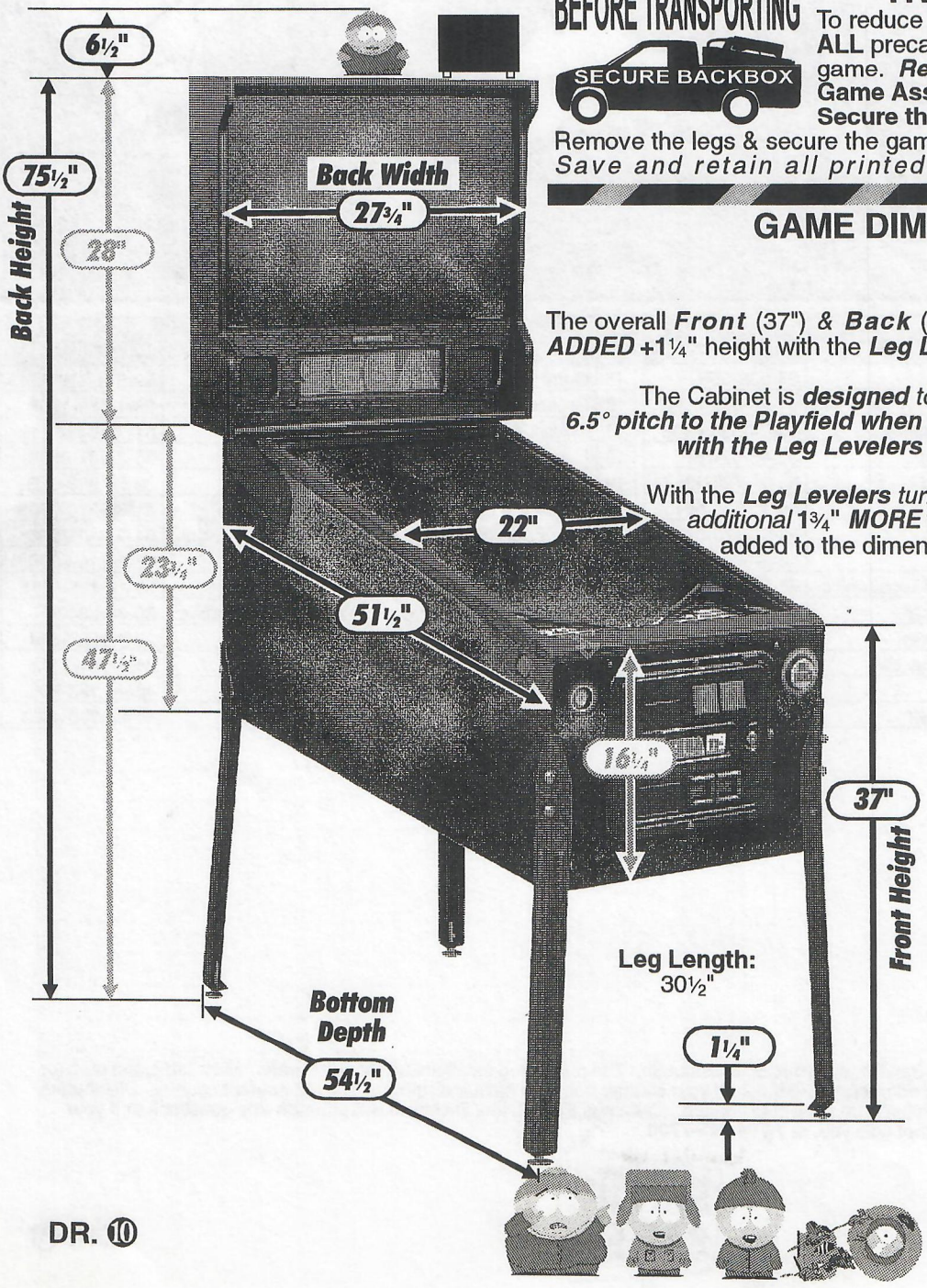
Normal Line:	**110v AC - 125v AC @ 60Hz**	
Domestic uses an 8AMP 250v Slo-Blo Fuse.	**AVG OPERATION** CURRENT: **2.8AMP** WATTAGE: **329W**	**MAX OPERATION** CURRENT: **8AMP** WATTAGE: **940W**
High Line:	**218v AC - 240v AC @ 50Hz**	
Export uses 5AMP 250v Slo-Blo Fuses. (*England & Hong Kong use an 8AMP 250v S/B Fuse.)	**AVG OPERATION** CURRENT: **1.8AMP** WATTAGE: **412W**	**MAX OPERATION** CURRENT: **5AMP** | **8AMP*** (England & Hong Kong use an 8A F.) WATTAGE: **1145W** | **1832W***
Low Line:	**95v AC - 108v AC @ 50Hz / 60Hz**	
Export Japan Only uses an 8AMP 250v Slo-Blo Fuse.	**AVG OPERATION** CURRENT: **2.6AMP** WATTAGE: **264W**	**MAX OPERATION** CURRENT: **8AMP** WATTAGE: **812W**

TRANSPORTATION

BEFORE TRANSPORTING

To reduce the possibility of damage, observe **ALL** precautions whenever transporting the game. ***Read & follow*** *Section 1, Chapter 1,* **Game Assembly Procedures**, & **How to Secure the Backbox for Transporting**.
Remove the legs & secure the game within the transporting vehicle.
Save and retain all printed information on the game.

GAME DIMENSIONS



The overall ***Front*** (37") & ***Back*** (75½") dimensions reflect the ***ADDED*** +1¼" height with the ***Leg Levelers*** *turned all the way* ***in***;

The Cabinet is ***designed*** *to give the recommended* ***6.5° pitch to the Playfield when all four (4) Legs are installed with the Leg Levelers*** *turned all the way* ***in***.

With the ***Leg Levelers*** *turned all the way* ***out***, *an additional* 1¾" ***MORE*** to the overall height should be added to the dimensions.

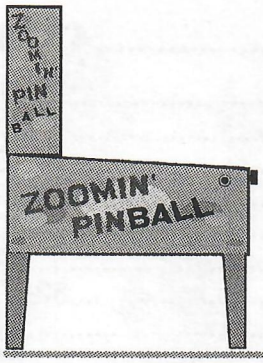
Shipping Box Dimensions

Height: 55½"
Width: 30½"
Depth: 31"
Weight: 250lbs. (+/- 3)

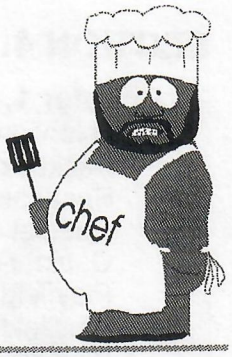
CAUTION

At least 2 people are required to move and maneuver this game. Use proper moving equipment & extreme care while handling!

Find-It-In-Front:
Dr. Pinball



SOUTH PARK™



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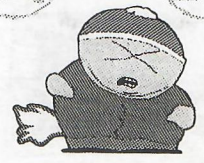


SEGA™ PINBALL, INC.

January 1999

Game Set-Up

Game Assembly Procedures

(Reference Find-It-In-Front: Dr. Pinball)

1. Open the top of the carton and lay it on its side with the bottom of the cabinet down. Using the plastic banding strip as a handle, slide the game out of the carton. ***CAUTION:*** *At least 2 people are required to move and maneuver game. Use proper moving equipment & extreme care while handling.* **Pinball game is 250 lbs.+.** Refer to **DR. ⑩** for Power Requirements, Transportation and Game Dimensions.

2. Remove all packing material. The four (4) Cabinet Leg Assemblies (Leg Levelers are attached) are in the corner packing material of the crate. A large Allen Wrench (use for securing the backbox) is inserted and taped to the rear of the cabinet. Leg Bolts, Steel Balls and any miscellaneous parts are in the cash box.

3. Support rear of cabinet and attach rear legs using two leg bolts for each leg. Support front of cabinet and attach front legs using two leg bolts for each leg.

4. While assuring that no cables are being pinched, carefully raise the backbox and secure it in its upright position with the Allen Wrench in the hole in the back of the cabinet and rotating the wrench 270° (¾ turn).

5. Remove the Coin Door Keys from the playfield glass, and open the Coin Door. Remove the Backbox Keys hanging inside the Coin Door, unlock the Backbox and open.

6. Check all connectors in the backbox for loose wire terminations. Reseat any loose wire by pushing in on the terminal. Push on all connectors plugged into the CPU/Sound Board, I/O Power Driver Board, and the Display Power Bd. to check that they are properly seated. Ensure Fluorescent Light Tube is seated correctly. Check that all fuses are seated properly. Close and lock the Backbox and secure its' keys back inside the Coin Door.

7. Remove the Front Molding & carefully remove the playfield glass and set it aside.

8. Remove all shipping tie downs, shipping blocks, packing foam, shipping instruction pages, etc. (if any) inside the cabinet. ***READ ALL PRINTED INFORMATION!*** Shipping instructions, labels and/or decals describe warnings, cautions, and/or important information specific to the game.

9. Raise the playfield and support it, by lifting the Prop Rod (located either on the left or right side, inside the cabinet) and placing the notched end into the hole on the under playfield. See the illustration "Easy Access Service System" opposite this page.

10. Visually inspect all cabinet cables and connector terminations; ensure no wires or cables are pinched and that cable harnesses are not pulled tight.

11. Remove the Plumb Bob tilt from the parts package and install on the pendulum wire on the inside left of the cabinet. Check the plumb tilt and adjust as required. See Section 4, Chapter 1, Parts Identification & Location.

12. Lower the playfield and ensure game is level side-to-side by adjusting Leg Levelers, if required. See the illustration "Leg Leveler Adjustment" opposite this page.

13. With the Leg Levelers turned all the way in (1.25" from floor to bottom of leg), the game pitch is 6.5°; depending on the condition of the floor, adjust the Leg Levelers as required.

The playfield incline affects difficulty of play. Use the recommended incline; Game difficulty is best varied using game adjustments.

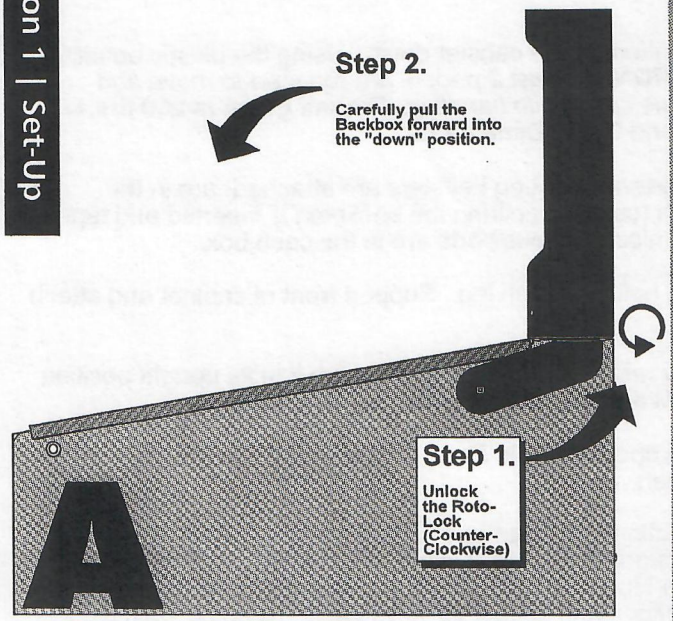
14. If desired, perform any self tests at this time. See Section 3, Chapter 1, Portals™ Service Menu Introduction, and Chapter 2, Go To Diagnostics Menu, for instructions on how to enter "Begin Play Test" and "Game Specific" to test components on the game.

15. **INSTALL 5 BALLS** on the playfield near the outhole and carefully reinstall the playfield glass. (Amount of balls are always specified on decal attached to the lock down assembly.)

16. If desired, make Game Pricing (Standard and/or Custom) and Add-A-Ball, Novelty, or X-Ball Play adjustments at this time. See Section 3, Chapter 4, Go To Adjustments Menu, for instructions on how to enter adjustments. Follow instructions in the tables provided in the manual for suggestions of customizing changes.

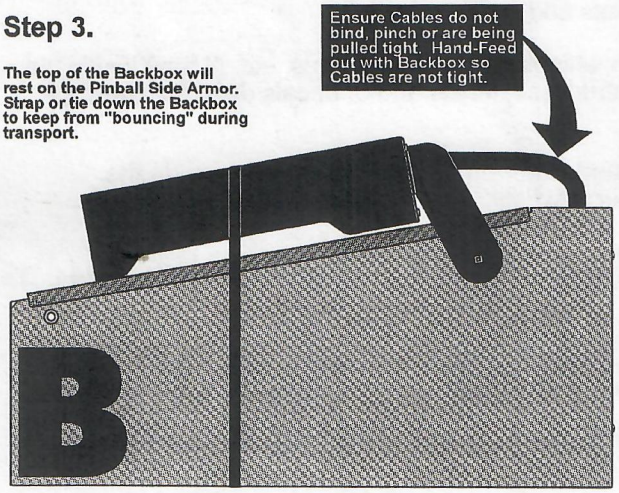
➡Per CE "The appliance has to be placed in a horizontal position."
"This appliance is not to be cleaned by a Water Jet."

How to Secure the Backbox for Transporting



Step 3.

The top of the Backbox will rest on the Pinball Side Armor. Strap or tie down the Backbox to keep from "bouncing" during transport.



See Section 4, Chapter 1, Backbox (Back Side/ Front Side) Assemblies, for part numbers.

Leg Leveler Adjustment

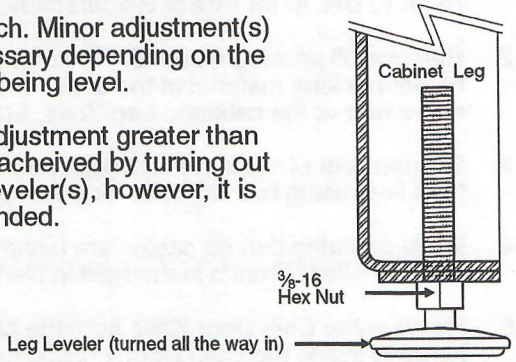
This cabinet is designed to automatically have a 6.5° pitch without any Leg Leveler adjustment!

Attach the four (4) Leg Assemblies to cabinet corners with the eight (8) leg bolts provided. See Section 4, Chapter 1, Cabinet - General Parts, for part numbers.

YOUR PLAYFIELD PITCH IS NOW AT 6.5° AS REQUIRED FOR PROPER GAME PLAY!

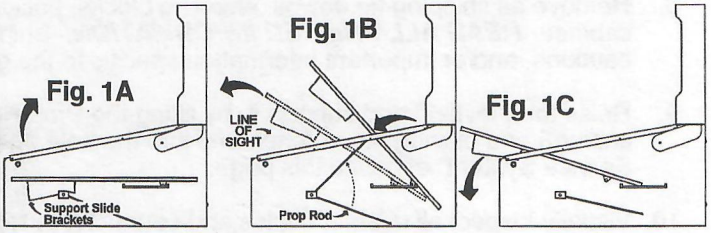
Verify 6.5° pitch. Minor adjustment(s) may be necessary depending on the location floor being level.

For custom adjustment greater than >6.5° can be acheived by turning out the rear leg leveler(s), however, it is not recommended.



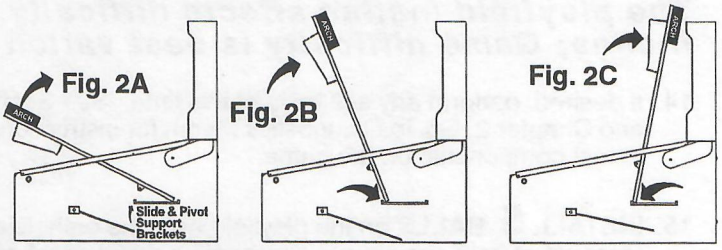
Easy Access Service System - 3 Positions

Carefully lift the playfield ***using the Left and Right Ball Guides*** upward.



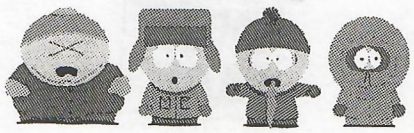
Positions 1 & 2

When lifted high enough, the ***Playfield Support Slide Brackets*** (Fig. 1A) can be seen & can clear the cabinet front. At this time, pull the playfield toward the front of the cabinet, checking that the mechanical components clear the cabinet front, then rest the playfield on the ***Playfield Support Slide Brackets*** at the front channel of cabinet (Fig. 1C); Or, the ***Prop Rod*** (located on the right inside of cabinet) can be used by positioning the ***Prop Rod*** end into the receiving playfield hole (Fig. 1B).



Position 3

With the playfield at rest, hold the sides & pull toward the front of the cabinet (approx. 6" to 8"), until resistance is felt from ***Edge Slide Brackets*** stopping against the ***Slide & Pivot Support Brackets*** located on either side of the cabinet (Fig. 2A). At this time, *swivel the playfield* toward the Backbox, then rest on the top edge (Fig. 2B & 2C).



Game Operation & Features

Start of Game Features

Starting a Normal Game

Insert coin(s). The game generates a sound for the first coin & for each subsequent coin with the display indicating the number of credits posted. Press the **START BUTTON** and a start-up sound is produced, and the posted credits are reduced by one. Subsequent players can be added (**up to 6 can play!**) by pressing the **START BUTTON** before the end of ball 1 (with sufficient credit in the game).

The display now indicates the player or # of players selected from the total depressions of the **START BUTTON**. The display indicates the ball in play, and a ball is served to the *Shooter Lane*. An introduction is shown followed by Skill Shot Graphics and/or instructions. Pressing the **START BUTTON** after ball 1 of any player will start a new game (if credits are available), ***but only*** if the **START BUTTON** is depressed for 2-3 seconds. This delay is to avoid accidental "re-starts" of a game. (Note: Any ½ credit remaining during game play after the end of ball 1, or power down, will be eliminated.)

Starting Team Play (Doubles!)

Team Play is a four player game. The totals for players 1 & 3 (Team 1) and players 2 & 4 (Team 2) are displayed individually as well as the combined score for both teams. Team Play only works in a 4-Player game. In all other cases, the individual scores are shown.

Starting League/Tournament Play

After credit is posted, while holding in the **LEFT FLIPPER BUTTON**, press the **START BUTTON**. League Play has now begun. The differences between Normal Game Play and League/Tournament Play are: There is no "auto-percentaging" (awarding extra balls, specials, etc. to players with very low scores on the second or third ball). Mystery Features are awarded in a set order rather than random in Normal Game Play. Percentage Game Features are not automatically advanced as they are for the Regular Play Features.

Starting Pinball Wizard Play

After credit is posted, while holding in the **RIGHT FLIPPER BUTTON**, press the **START BUTTON**. Pinball Wizard Play has now begun. The same as League/Tournament Play, but ooooooh! so much gosh darn harder!

During Game Features

Feature Mode & Combination Shots

Features are lit on the playfield and started by completing certain play shots (e.g. completion of target banks, orbit(s), ramp(s) and/or any combination of the shots). Combination shots (combos) are a series of shots completed in many different variations. For example, a shot to the Ramp with the ball being returned to the Left Inlane then immediately shot to the Orbit of the playfield returning to a Flipper and then shot to another Ramp would be a hard combo shot worthy of many points. These combinations vary per game. For feature modes & combos certain points or awards are given after completion.

Multiball

Multiball is started after completion of certain Feature Modes or may be a mode itself depending on game rules/play. Multiball may vary with the amount of balls used in Multiball depending on game style. Typically, if Multiball play was short, a "restart" option is given. Watch the Display for instructions on the restart.

Replay Feature

Replay awards are given as the player exceeds a High Score Level during game play. This can be adjusted with Adjustment 3, Replay Awards (Default=**CREDIT**, adjustable). Players exceeding the High Score Levels can receive: **CREDIT**, **EXTRA BALL**, or **SPECIAL**. Adjust to **NONE** if a replay award is not desired.

Video Mode

The video modes ***may*** require the player to "*play on-screen*". The interactive video play ***may*** require the player to use the flipper buttons to play the mode.

End of Game Features

Game Endings

When all player(s) have played all balls (including any Extra Balls), the game ends. If power is interrupted during the course of a game, it will end that game (***see Starting a Normal Game***). Closure of the Plumb Bob Tilt Switch according to the number of tilts set (Default = 2, adjustable) or its prolonged closure will end the current Ball-In-Play. Closure of the Slam Tilt Switch on the coin door ends the current game(s).

Match Feature

At the end of each ball, earned bonuses are collected. At the end of the last ball of a game (including any extra balls, if applicable), earned bonuses are collected, then the system produces a random 2-digit number (a multiple of 10; 00 to 90). Matching the last 2 digits of the player's score with this number awards a credit. In Adj. 11, Match Percentage (Default=**7%**, adjustable) can be changed from 0-10%. Changing the percentage to **0%** displays the "Match Animation" at the end of the game, however, will never match (to award a credit). Changing this adjustment to **OFF** will not display the "Match Animation" nor award a credit.

Continued Next Page.

End of Game Features Continued

Entering Initials

If player achieved a new high score in any of the 3 categories (Regular, Novice or Wizard), the player may enter his/her initials. To enter your initials, use the Left & Right Flipper Buttons to choose letter or character as seen on the Dot Display. Hitting the Start Button locks in the letter or character and proceeds to the next letter. The game then proceeds into the *Game-Over Mode* and then to the *Attract Mode*. (Note: A custom message (adjustable) can be displayed during the *Attract Mode*; enter letters in the same fashion.)

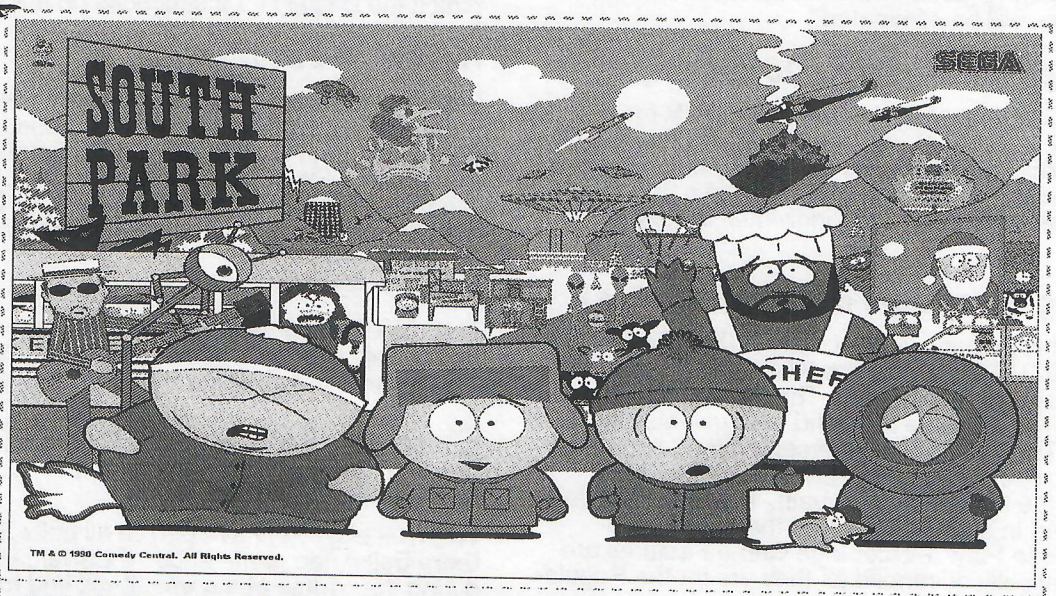
Manual Percentaging

This game is equipped with a Manual Percentage Adjustment. As with our previous games, you can either set operator adjustments for a replay percent or you can set a fixed replay score. See Section 3, Chapter 4, Go To Adjustments Menu, Adjustments 1 & 2. If you set operator adjustments for a particular replay percent, the game will compute a recommended score to keep the game at that replay percentage. If a change is recommended and the game coin door is opened, the display will indicate if the replay is too high or low and make a sound to alert the operator. By pressing the Start Button, the score to beat will be changed to a more appropriate level. If you close the Coin Door or enter the **Portals™ Service Menu**, no score change will be made. You may choose to ignore the recommended change; for example, you may not think last week's players were the usual crowd. Just close the door and the message will disappear without altering the existing level. Or you may choose to make a different score to beat adjustment; this is done by utilizing Adj. 2, Replay Levels.

Instruction Card

Below is a **COPY** of the game instruction card which is included with every game. If your card is lost or damaged, simply **COPY** this page and *cut out* the Instruction Card as a *temporary replacement* until a *new card is ordered.* (***Suggestion:*** **COPY & CUT** along the dotted line and fold in the center to keep the "COPY" sturdy.)

COPY & CUT



FOLD HERE

SKILL SHOT Collect ***Flashing Light*** on the side **Targets** for points. Use **Flippers** to *change lights.*

MULTIBALL Shoot **Targets** below **Toilet** until completed. Then *shoot* **Ramp** to begin ***Multiball.***

FEATURES Shoot a **Character** the *indicated number of times* to ***START Feature***:

- ★ **STAN** Shoot **STAN** to collect ***Jackpots.*** Collect indicated ***Jackpots*** to "Complete."
- ★ **CHEF** Shoot ***Flashing Shots*** to collect awards. Complete all ***Flashing Shots*** to "Complete."
- ★ **KYLE** Shoot **Ramp** to "Complete."
- ★ **KENNY** Shoot **KENNY** to collect award and "Complete."
- ★ **CARTMAN** Shoot **CARTMAN** to collect award. Collect indicated awards to "Complete."

Note: If the face of a character is lit solid, then he has been completed.
If the face of a character is flashing, then he has been "Played but not completed."

SPOOKY VISION Playing all character's features, lights ***CHEF Shot*** for ***SPOOKY VISION.*** During ***Spooky Vision***, completing all shots increases ***Jackpot.***

VOLCANO Completing all character's features, lights ***CHEF Shot*** for ***VOLCANO.*** During ***Volcano***, complete all characters (*each shot three (3) times*) to receive ***WIZARD AWARD.***

EXTRA BALL ***Mystery*** or ***Consolation*** may light ***Extra Ball.***

SPECIAL ***Consolation*** or ***Features*** may light ***Special.***

Note to Beginners: To score better, shoot at the (((FLASHING SHOTS))) !!
Be sure to LOOK UP at the Dot Display for instructions when possible.

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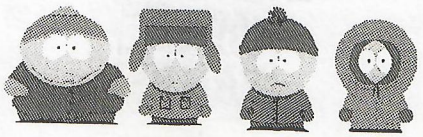
Sega Part № 755-5171-00



Portals™ Service Menu Introduction

Section 3
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Service Switch Set (Red, Green & Black Buttons) Access & Use

Open Coin Door and view Service Switch Set (see figures below). The Memory Protect Switch is now disabled; when changing adjustments, leave the coin door open, so changes can be made. ***Important:*** The **Playfield Power Interlock Switch** must be pulled out for electro-mechanical device testing (this is required).

① *Entering* Portals™ Service Menu *(will not operate in Volume Mode):*

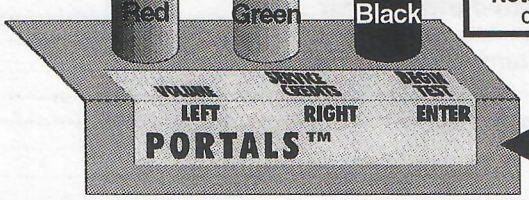
Step 2
Move through the menus by pushing the **Red "LEFT"** or **Green "RIGHT" Buttons.**

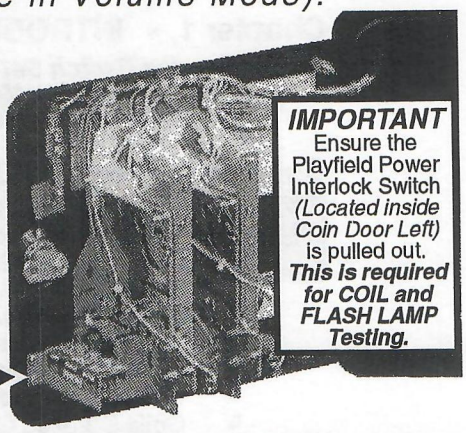
Note: Pushing the **Left** or **Right Flipper Buttons** operates in the same way.

Step 1 (Black Button 1st)
Enter the Portals™ Service Menu by pushing the **Black "BEGIN TEST" Button.**

Step 3
Select or activate icons by pushing the **Black "ENTER" Button.**

Note: Pushing the **Start Button** operates in the same way.



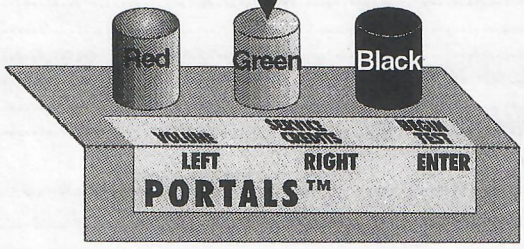


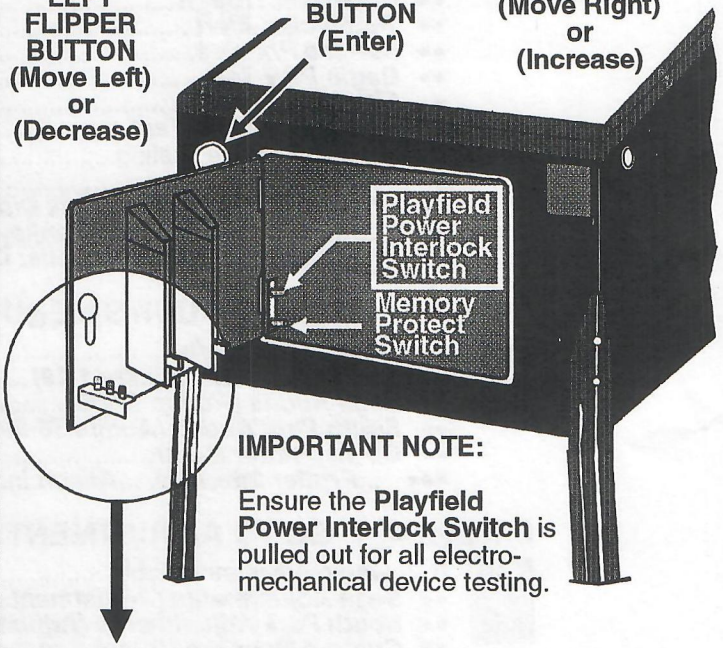
IMPORTANT
Ensure the Playfield Power Interlock Switch *(Located inside Coin Door Left)* is pulled out. ***This is required for COIL and FLASH LAMP Testing.***

② *Adding* Service Credits *(will not operate in Service or Volume Modes):*

Step 1 (Green Button 1st)
Receive service credits by pushing the **Green "SERVICE CREDITS" Button.**

This button allows the technician to add Service Credits without adding any counts to the Coin Audits. Up to 30 credits can be applied.



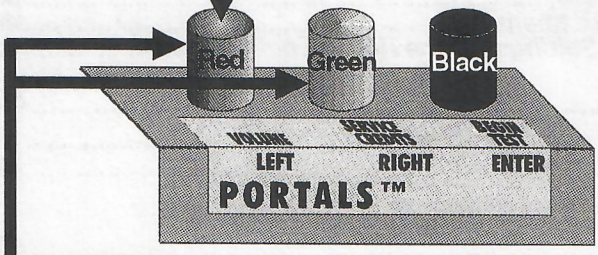

LEFT FLIPPER BUTTON (Move Left) or (Decrease)
START BUTTON (Enter)
RIGHT FLIPPER BUTTON (Move Right) or (Increase)
Playfield Power Interlock Switch
Memory Protect Switch

IMPORTANT NOTE:

Ensure the **Playfield Power Interlock Switch** is pulled out for all electro-mechanical device testing.

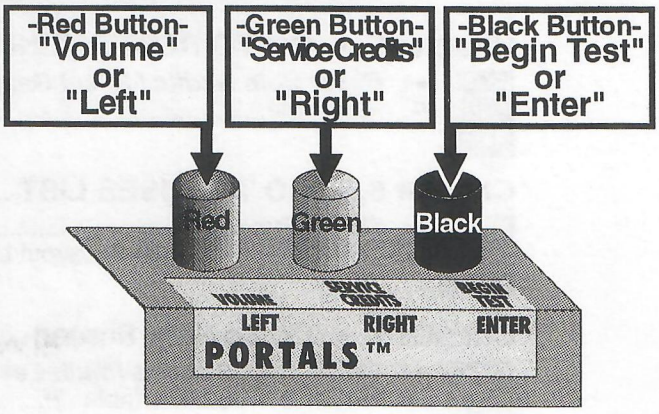
③ *Entering the* Volume Menu *(will not operate in Service Mode):*

Step 1 (Red Button 1st)
Enter the Volume Menu by pushing the **Red "VOLUME" Button.**

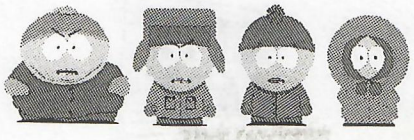


Step 2
* ***Decrease*** volume by pushing the **Red "LEFT" Button.**
* ***Increase*** volume by pushing the **Green "RIGHT" Button.**

Note: Pushing the **Left** or **Right Flipper Buttons** operates in the same way. Once adjustments are made, this menu will automatically exit in a few seconds.



Section 3 | Icon Intro

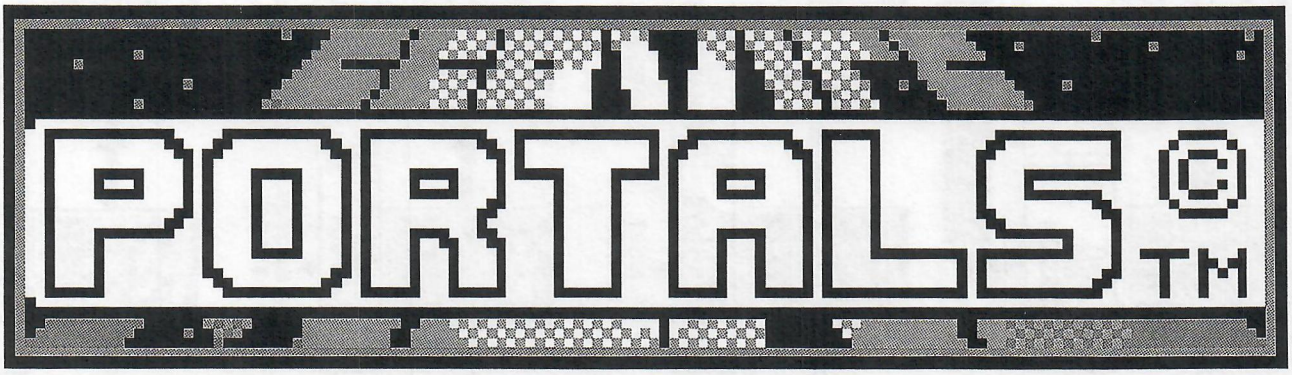


How to Use This Section

This section will cover all functions available in the **Portals™ Service Menu** in a *Step-By-Step* process. This section is divided into chapters which coincide with the **MAIN MENU**. The following pages in this chapter will instruct the operator on how to move through the menus. It's simple, easy and fun to use!

To get into the Service Menu Mode: • Power-up game (if not already) & open the Coin Door. • On the Coin Door is the Service Switch Set (**Red**, **Green** & **Black Buttons**). Push down the **Black "BEGIN TEST" Button**.

Looking at the Video Display you will momentarily see the introductory screen "**Service Menu**" with a *satellite flying from right to left pulling a banner* "**Portals™ ©**" followed by the **MAIN MENU**:

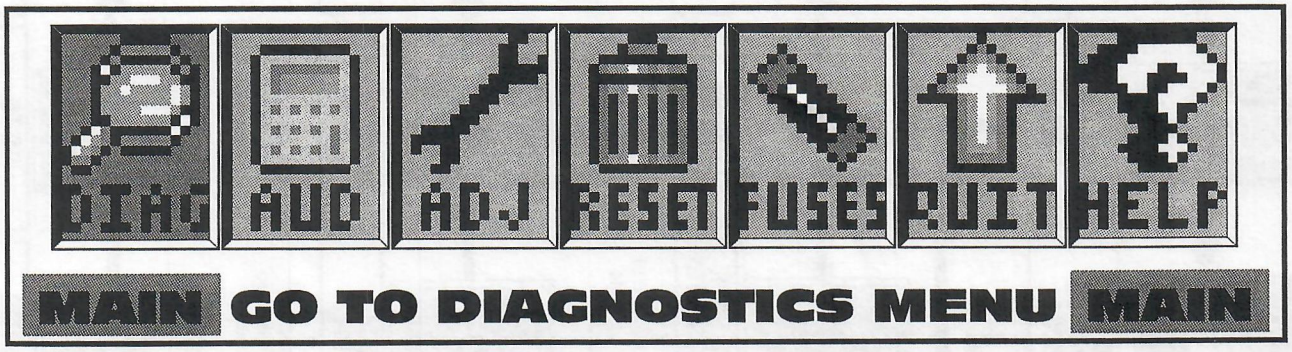


The Coin Door may be closed for security, however, please note with the Coin Door closed, the game's ***MEMORY PROTECT*** is enabled; ***meaning any changes that are made will be not be written to memory***. If changing adjustments is required, ensure the Coin Door is open.

Use the **Red "LEFT" & Green "RIGHT" Buttons** (or **Left** & **Right Flipper Buttons**) to move the selected **ICON** left or right, and the **Black "ENTER" Button** (or **Start Button**) to activate the selected **ICON**. The use of the Service Switch Set (**Red**, **Green**, & **Black Buttons**) *is required* in Switch Test or Active Switch Test, as the **Start & Flipper Buttons** are a part of this test.

For diagnostic purposes, be sure the ***Playfield Power Interlock Switch*** is pulled out so ***Playfield Power*** is not disabled.

The **MAIN MENU** now appears with the "DIAG" *Icon* (**DIAGNOSTICS MENU**) flashing:

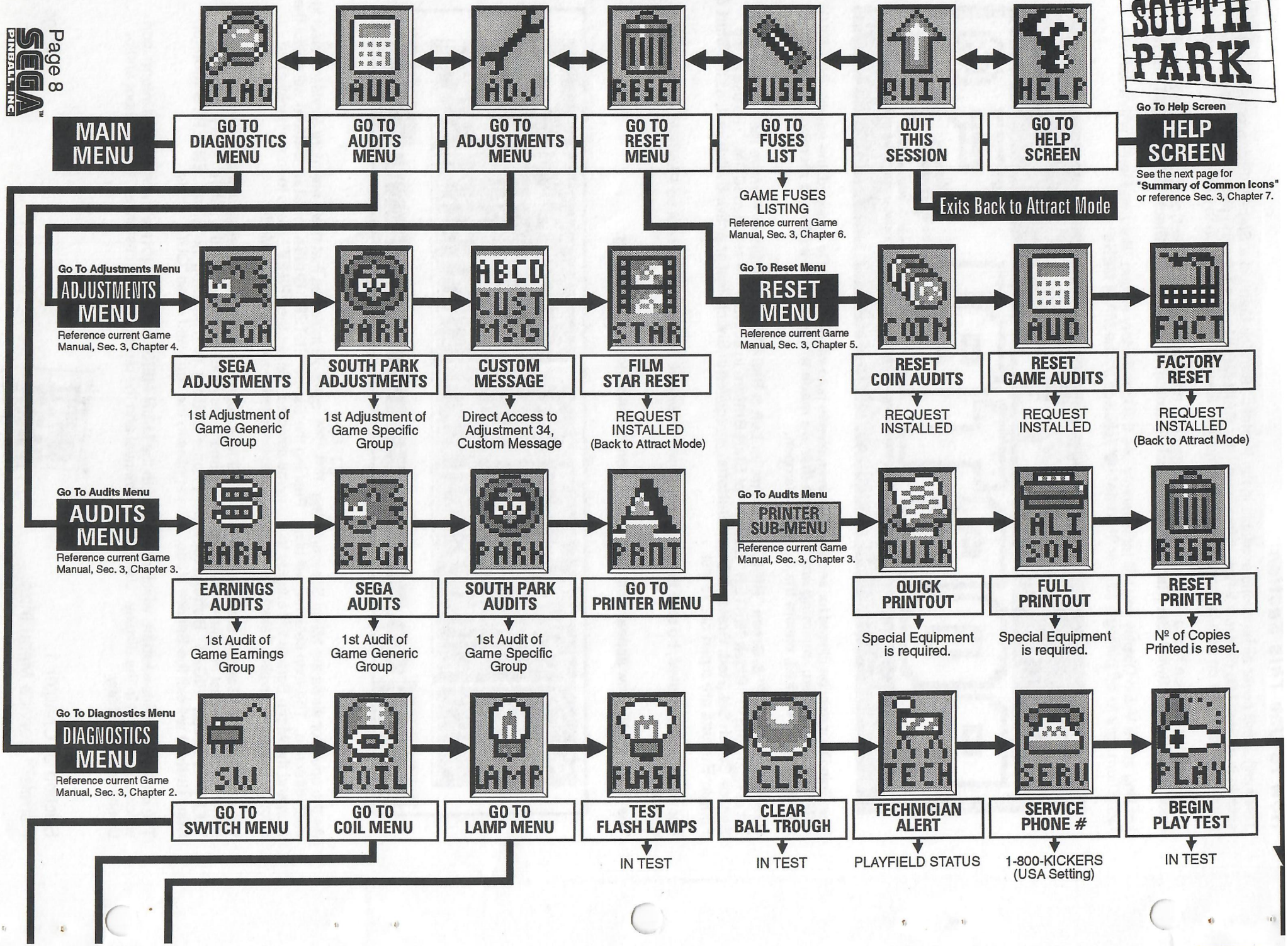


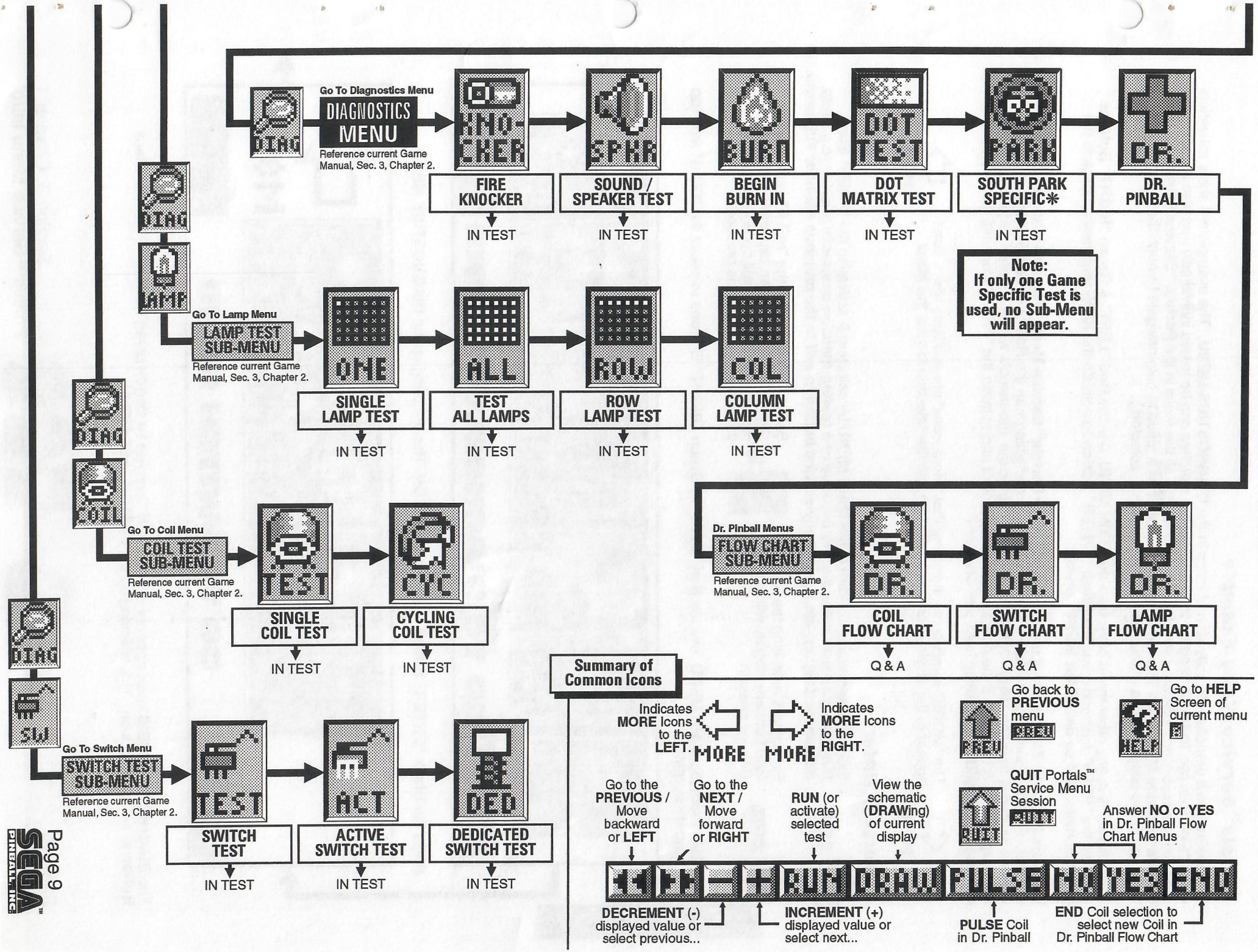
As the operator views the Menu Screen(s), the ⇦ MORE ⇨ MORE symbols indicates that there are more *Icons* to select in each direction. The *Icon* selected will blink. Pushing the **Black "ENTER" Button** (or **Start Button**) will select the *Icon* and the Menu Screen will change to the menu selected. Select the **"PREV"** *Icons* to move backwards through the menu levels. Select the **"QUIT"** *Icon* to completely exit the Service Mode.

View the **Portals™ Service Menu Icon Tree** on the next pages for a complete overview of all menus used in this system. View the last chapter (HELP) if more information is required. Selecting the "QUIT" *Icon* with the **Red "LEFT"** or **Green "RIGHT" Buttons** (or either **Flipper Button**), then pressing the **Black "ENTER" Button** (or **Start Button**) will exit the Service Mode. This applies to the large and small "QUIT" *Icons*.

The **chapters** in this **section**, which coincide with the **MAIN MENU**, will also provide more detailed information which could not fit in the display. Use both the manual and the display to help customize, troubleshoot and/or diagnose faults, if any.

Portals™ Service Menu Icon Tree for *South Park*


SOUTH PARK™
MAIN MENU
GO TO DIAGNOSTICS MENU
GO TO AUDITS MENU
GO TO ADJUSTMENTS MENU
GO TO RESET MENU
GO TO FUSES LIST
QUIT THIS SESSION
GO TO HELP SCREEN
Go To Help Screen
HELP SCREEN
See the next page for "Summary of Common Icons" or reference Sec. 3, Chapter 7.
GAME FUSES LISTING
Reference current Game Manual, Sec. 3, Chapter 6.
Exits Back to Attract Mode
Go To Adjustments Menu
ADJUSTMENTS MENU
Reference current Game Manual, Sec. 3, Chapter 4.
SEGA ADJUSTMENTS
1st Adjustment of Game Generic Group
SOUTH PARK ADJUSTMENTS
1st Adjustment of Game Specific Group
CUSTOM MESSAGE
Direct Access to Adjustment 34, Custom Message
FILM STAR RESET
REQUEST INSTALLED (Back to Attract Mode)
Go To Reset Menu
RESET MENU
Reference current Game Manual, Sec. 3, Chapter 5.
RESET COIN AUDITS
REQUEST INSTALLED
RESET GAME AUDITS
REQUEST INSTALLED
FACTORY RESET
REQUEST INSTALLED (Back to Attract Mode)
Go To Audits Menu
AUDITS MENU
Reference current Game Manual, Sec. 3, Chapter 3.
EARNINGS AUDITS
1st Audit of Game Earnings Group
SEGA AUDITS
1st Audit of Game Generic Group
SOUTH PARK AUDITS
1st Audit of Game Specific Group
GO TO PRINTER MENU
Go To Audits Menu
PRINTER SUB-MENU
Reference current Game Manual, Sec. 3, Chapter 3.
QUICK PRINTOUT
Special Equipment is required.
FULL PRINTOUT
Special Equipment is required.
RESET PRINTER
Nº of Copies Printed is reset.
Go To Diagnostics Menu
DIAGNOSTICS MENU
Reference current Game Manual, Sec. 3, Chapter 2.
GO TO SWITCH MENU
GO TO COIL MENU
GO TO LAMP MENU
TEST FLASH LAMPS
IN TEST
CLEAR BALL TROUGH
IN TEST
TECHNICIAN ALERT
PLAYFIELD STATUS
SERVICE PHONE #
1-800-KICKERS (USA Setting)
BEGIN PLAY TEST
IN TEST


Go To Diagnostics Menu
DIAGNOSTICS MENU
Reference current Game Manual, Sec. 3, Chapter 2.
DIAG
KNO-CKER
SPKR
BURN
DOT TEST
PARK
DR.
FIRE KNOCKER
SOUND / SPEAKER TEST
BEGIN BURN IN
DOT MATRIX TEST
SOUTH PARK SPECIFIC*
DR. PINBALL
IN TEST
Note: If only one Game Specific Test is used, no Sub-Menu will appear.
LAMP
Go To Lamp Menu
LAMP TEST SUB-MENU
Reference current Game Manual, Sec. 3, Chapter 2.
ONE
ALL
ROW
COL
SINGLE LAMP TEST
TEST ALL LAMPS
ROW LAMP TEST
COLUMN LAMP TEST
COIL
Go To Coil Menu
COIL TEST SUB-MENU
Reference current Game Manual, Sec. 3, Chapter 2.
TEST
CYC
SINGLE COIL TEST
CYCLING COIL TEST
Dr. Pinball Menus
FLOW CHART SUB-MENU
Reference current Game Manual, Sec. 3, Chapter 2.
COIL FLOW CHART
SWITCH FLOW CHART
LAMP FLOW CHART
Q & A
SW
Go To Switch Menu
SWITCH TEST SUB-MENU
Reference current Game Manual, Sec. 3, Chapter 2.
ACT
DED
SWITCH TEST
ACTIVE SWITCH TEST
DEDICATED SWITCH TEST
Summary of Common Icons
Indicates MORE Icons to the LEFT.
Indicates MORE Icons to the RIGHT.
Go back to PREVIOUS menu
Go to HELP Screen of current menu
Go to the PREVIOUS / Move backward or LEFT
Go to the NEXT / Move forward or RIGHT
RUN (or activate) selected test
View the schematic (DRAWing) of current display
QUIT Portals™ Service Menu Session
Answer NO or YES in Dr. Pinball Flow Chart Menus
RUN
DRAW
PULSE
NO
YES
END
DECREMENT (-) displayed value or select previous...
INCREMENT (+) displayed value or select next...
PULSE Coil in Dr. Pinball
END Coil selection to select new Coil in Dr. Pinball Flow Chart

Portals™ Service Menu Example

This example will demonstrate activation of *Icons* in the **DIAGNOSTICS MENU**. The example will show activation of the "SW" *Icon* (**GO TO SWITCH MENU**). In this menu, the switches can be tested individually and also all active switches can be tested. Use the same technique to access all the *Icons* in the **Portals™ Service Menu**. Follow **Portals™ Service Menu Icon Tree** on the previous pages as a guide to help navigate through the entire system (Also, go to the chapter in this manual explaining the icon(s) selected.).

If the display is in any other menu other than the **MAIN MENU**, use the **Red "LEFT"** & **Green "RIGHT" Buttons** to select the "PREV" *Icon* and press the **Black "ENTER" Button** to activate the **ICON** thus moving back to the previous menu. Do so until **MAIN MENU** appears.

Chapters 2 through 7 will cover all menu items within the **Portals™ Service Menu**. The *Icon* is shown preceding the text. Find the *Icon* in the **Portals™ Service Menu** by navigating with the **Red** or **Green Buttons**. Each chapter started is from the **MAIN MENU**. Within the chapter, the sub-menu's will be covered sequentially with their explanation & function. If the operator *"gets lost"*, select and activate the "PREV" *Icon* until the display indicates **MAIN MENU**. For more help, see Chapter 7.

The "MORE" *symbols* are indicating that *"more icons"* are available which don't appear in the display and which way to move the selection to view the *Icons*.

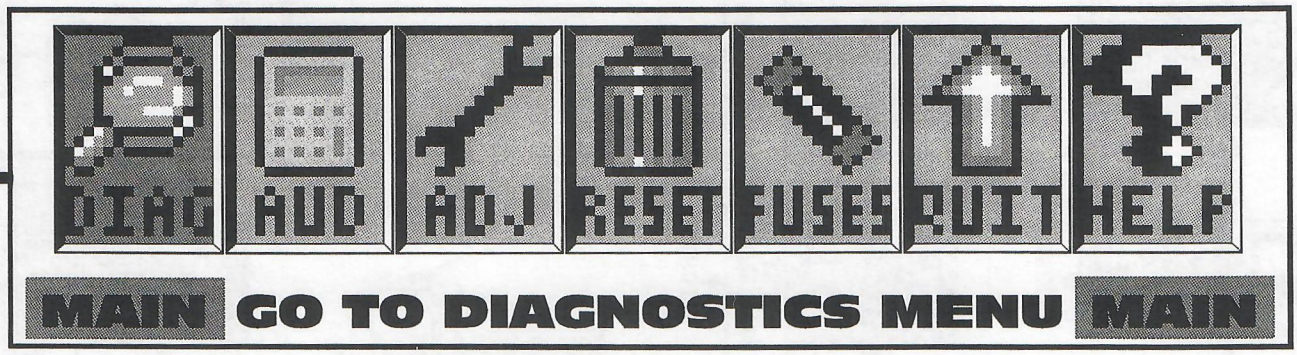
Important Note:

Exit any sub-menu and return to the **MAIN MENU** by selecting & activating the "PREV" *Icons*. ***If no Icons appear in the display because of a testing function or special display (e.g. Help, Schematic Display, etc.), press any service button to exit to the previous menu or sub-menu.***

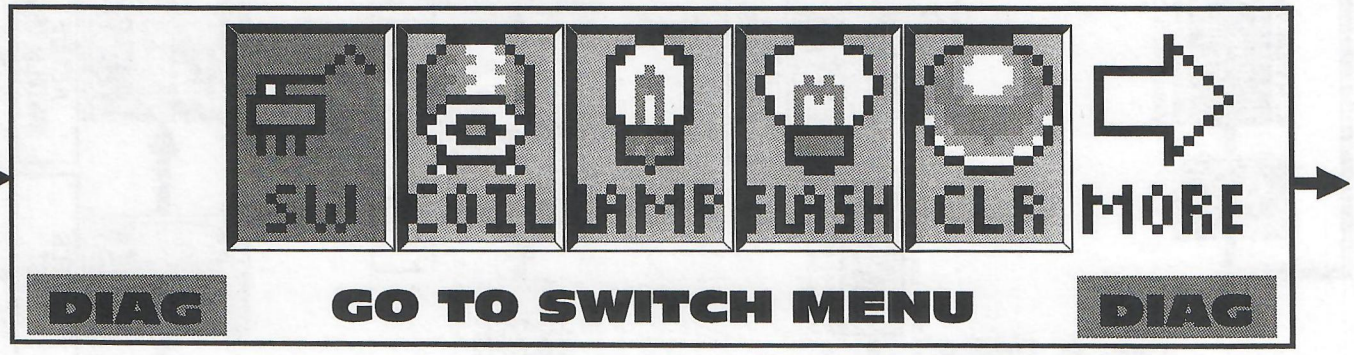
Selecting & activating the "QUIT" *Icon* from any display will exit the *Service Session.*

Selecting & activating the "HELP" *Icon* will show a help screen. (An explanation of each *Mini-Icon* at that level will cycle continuously until any active button is pressed.)

Example: From the **MAIN MENU**, use the **Red "LEFT"** or **Green "RIGHT" Buttons** to select the "DIAG" *Icon* (**GO TO DIAGNOSTICS MENU**).

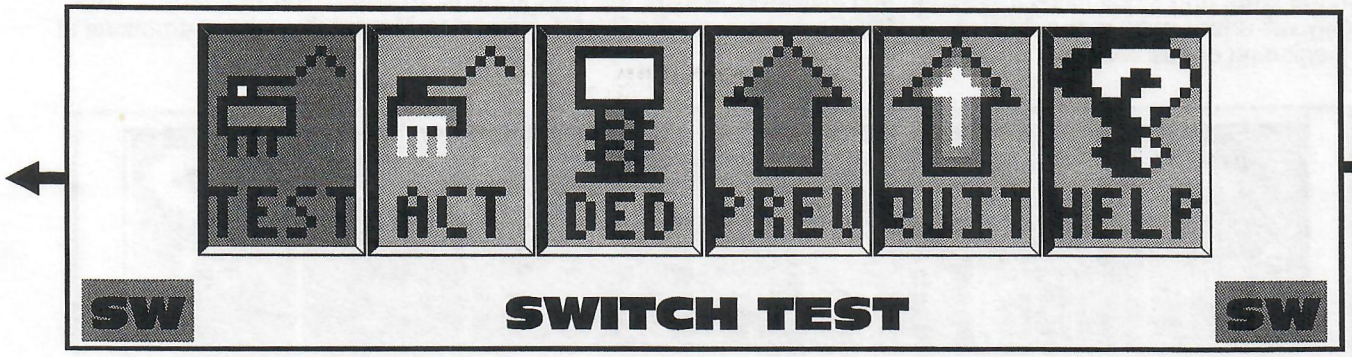


Press the **Black "ENTER" Button** to activate this **ICON**. This will bring up the **DIAGNOSTICS MENU**.

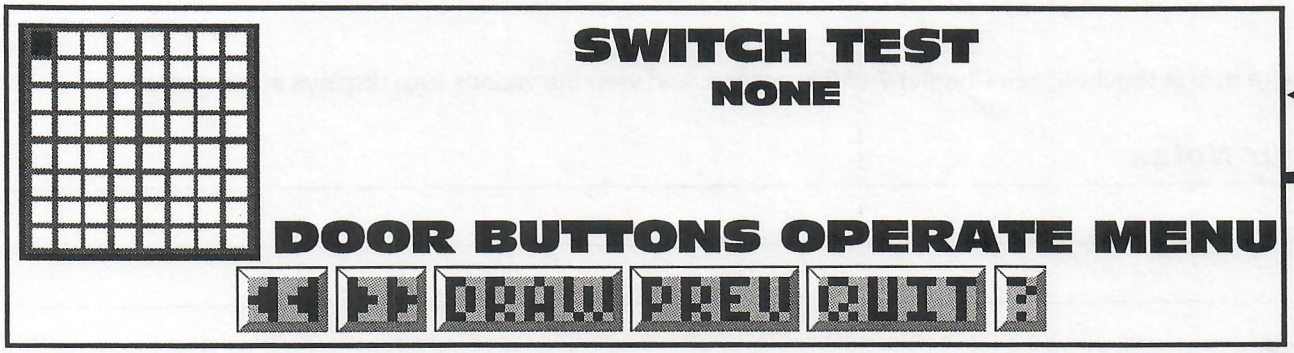


The **DIAGNOSTICS MENU** now appears with the "SW" *Icon* (**GO TO SWITCH MENU**) flashing. Press the **Black Button** to *activate* this icon. This will bring up the **SWITCH TEST MENU**.

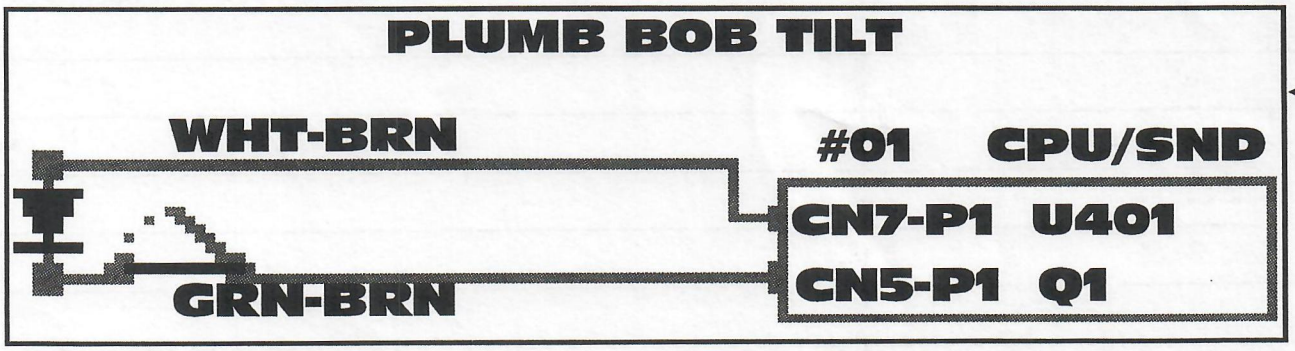
The **SWITCH TEST MENU** now appears with the "TEST" *Icon* (**SWITCH TEST**) flashing:
Press the **Black "ENTER" Button** to *activate* this icon. This will bring up the **Switch Test Display**.



The **Switch Test Display** now appears.



All switches can be tested one at a time (When possible, use a pinball to close any playfield switches; rolling the ball at Stand-Up Targets or over/under switches is suggested. Use finger for all non-playfield switches.) As each switch is closed, the respective Switch Matrix Grid Position (1-64) will be lit. To view the schematic for the switch selected, press the **Red** or **Green Buttons** to select the "DRAW" *Icon*. Press the **Black Button** to *activate* this icon. This will bring up the **Switch Schematic Display** for the switch being closed.



An example is shown with Switch #01, Plumb Bob Tilt, selected. The display describes the switch in the Switch Matrix which includes the name of the switch, the Return (Row) Wire and the Drive (Column) Wire, drive transistor, the part number (not shown in the above example) and the "Pin-Outs" from the CPU/Sound Board.

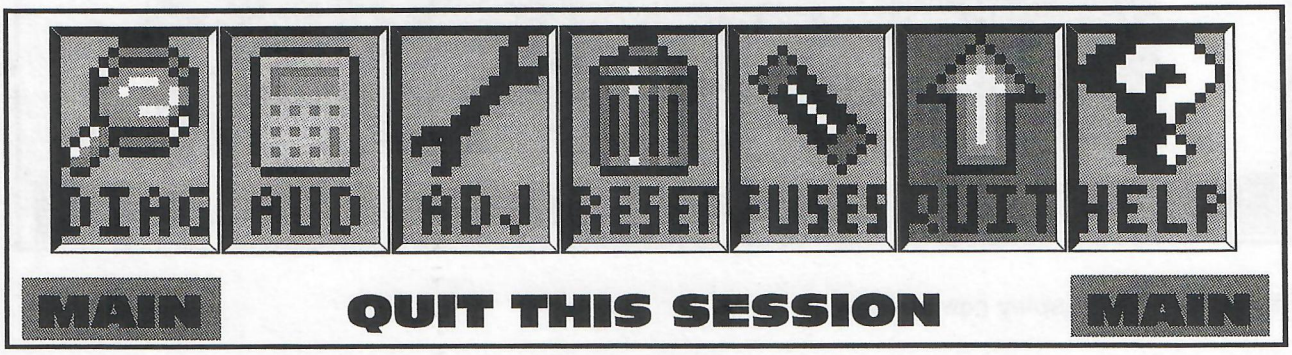
While in Switch or Active Switch Tests, the **Flipper & Start Buttons** are deactivated. Use the **Red "LEFT," Green "RIGHT"** and/or **Black "ENTER" Buttons** to select and activate the **"MINI-ICONS"** at the bottom of the display. In Switch Test, if the "Left Arrow" or "Right Arrow" *Icon* is activated, the display will go to the previous tests (Active and Dedicated Switch Tests). Use the **Red** or **Green Buttons** to change the selected **ICON** to "PREV" *Icon.* Press the **Black "ENTER" Button** to go to the previous menu.

Note:
In **Dedicated Switch Test**, the **Flipper & Start Buttons** are to be used instead of the **Red**, **Green** & **Black Service Buttons**, as these buttons are deactivated for this test.

Exit out of the sub-menu by activating the big "PREV" *Icon* in the menu. This will bring up the **DIAGNOSTICS MENU**. The Switch Test Session is now complete. See the next page about exiting the **Portals™ Service Menu**.

Exiting the Portals™ Service Menu

All *Icons* will be covered in the chapters of this section with the exception of the "QUIT" *Icon*, in the **MAIN MENU**. Both the large and small *Icons* if selected and activated, will exit the user from the **Portals™ Service Menu**. The display will return back to the **ATTRACT MODE**! To re-enter the **Portals™ Service Menu** follow the instructions at the beginning of this chapter.



If more help is required, see Chapter 7 of this section, and view the various help displays in the game.

Your Notes

Go To Diagnostics Menu

Special Note: If the ***display flashes*** **"OPEN THE DOOR"** the game is indicating that memory has been corrupted. This is caused be either failure in memory (e.g. batteries are dead and/or faulty **RAM**) or upon installation of updated version of game code. Opening the Coin Door will initiate a *Factory Restore*, by opening the ***Memory Protect Switch***. Check battery voltage at **CMOS RAM** with the power off.

Overview

The **Portals™ Service Menu System** provides tests for sounds, display, lamps, switches and coils. Each feature may be tested manually or automatically after entering the **Portals™ Service Menu** (see Chapter 1 of this section). Select the "DIAG" *Icon* from the **MAIN MENU** to go to the **DIAGNOSTICS MENU**. The automatic tests (e.g. ***Cycling Coils***, ***Test Flash Lamps***) may be used for a quick verification of automatic test functions and the manual tests (***Begin Play Test***, ***Single Lamp / All / Row / Column Tests***, and ***Game Specific Test***.) may be used for troubleshooting. All *Icons* and there usages are explained throughout this chapter.

During game play, activation of switches and operation of coils with associated switches are monitored. If the **CPU/Sound Board** does not detect a switch transition ("Stuck Open" / "Stuck Closed") for 50 games, it is considered faulty. When operation of a coil should close or open a switch and does not, the coil is considered faulty. In the Attract Mode, faulty switches and coils (if any) are reported (Select the "TECH" *Icon*, ***Technician Alert***, from the **DIAGNOSTICS MENU**). *Note that reporting of an unused switch does not constitute a problem and that a bad coil could mean that the associated switch requires adjustment.*

⚠ **CAUTION:** Remove pinballs from the Ball Trough prior to lifting the playfield for servicing. This can easily be done in the **Portals™ Service Menu System**. Select the "DIAG" *Icon* from the **MAIN MENU** to go to the **DIAGNOSTICS MENU**. Select the "CLR" *Icon* to enter the **CLEAR BALL TROUGH MENU**. Select the "RUN" *Icon* & press the **Start Button** to remove one ball at a time. This is also useful to retrieve one ball for game testing in ***Begin Play Test*** & ***Game Specific Test***. ***Important:*** The **Power Interlock Switch** must be pulled out.

GO TO DIAGNOSTICS MENU

With the game in the Attract Mode, open the Coin Door and press the **Black "BEGIN TEST" Button**. Select the "DIAG" *Icon* in the **MAIN MENU** with either **Flipper** or **Red "LEFT"** & **Green "Right" Buttons** (upon entry of the **Portals™ Service Menu**, the system defaults with the selection of the "DIAG" *Icon* flashing) and press the **Start** or **Black "ENTER" Buttons**. The **DIAGNOSTICS MENU** appears.

The "MORE" *symbols* are indicating that *"more icons"* are available which don't appear in the display and which way to move the selection to view the *Icons*.

Important Notes:

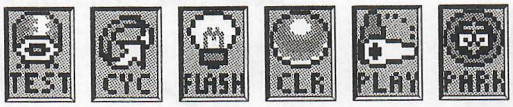
Exit any sub-menu and return to the **MAIN MENU** by selecting & activating the "PREV" *Icons*. If no *Icons* appear in the display because of a testing function or special display (e.g. "Help"), press any button to exit.

Selecting & activating the "HELP" *Icon* from any display will show a help screen. (An explanation of each *Mini-Icon* at that level will cycle continuously until any active button is pressed.)

Selecting & activating the "QUIT" *Icon* from any display will exit the Service Session.

In Diagnostics, selecting & activating the "-" or "+" *Icons* moves test forwards/backwards. Selecting & activating the "RUN" *Icon* repeats the test on the coil or flash lamp left off at. Selecting & activating the "ARROW" *Icons* moves between tests in the sub-menu. Selecting & activating the "DRAW" *Icon* will show the schematic for that switch or coil.

Some tests require navigation through the menu(s) and selection of the *Icons* with **ONLY** the **Red "LEFT," Green "RIGHT"** and **Black "ENTER" Buttons**. This is required in ***Switch*** & ***Active Switch Tests***, as the **Flipper** & **Start Buttons** are a part of the test.



In ***Single Coil Test***, ***Cycling Coil Test***, ***Test Flash Lamps***, ***Clear Ball Trough, Begin Play Test*** & ***South Park Specific*** Menu's, ***the*** **Power Interlock Switch** (inside Coin Door) must be pulled out. (See ***Access & Use*** in Chapter 1 of this section for the location.)

If the Power Interlock Switch is not pulled out, all electro-mechanical devices (such as Coils) cannot be tested (20v & 50v DC power is disabled). Closing the Coin Door will automatically reset this switch.

Go To Switch Menu

From the **DIAGNOSTICS MENU**, select the "SW" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. Switches are configured in an 8 x 8 Matrix of Columns (Switch Drives) and Rows (Switch Returns) with up to 64 switches possible. The Switch Test Menu consists of three (3) parts: Switch Test, Active Switches, and Dedicated Switch Test.

Note: The Flipper & Start Buttons are deactivated during Switch Tests.

Switch Test

To initiate, from the **SWITCH MENU**, select the "TEST" *Icon* with the **Red** or **Green Button** & press the **Black Button**. In Switch Test, close each switch and observe the display. The display will describe the switch in the Switch Matrix, which includes the switch name, Return (Row) Wire, Drive (Column) Wire, Part Nº, and the "Pin-Outs" from the CPU/SOUND Board. When the switch is released, the information of the last switch closed will remain in the display until another switch is closed or the test is exited. To view the switch schematic, select the "DRAW" *Mini-Icon* with the **Red** or **Green Button** & press the **Black Button**.

Active Switch Test

To initiate, from the **SWITCH MENU**, select the "ACT" *Icon* with either **Red** or **Green Button** & press the **Black Button**. If still in a previous test, select the "PREV" *Icon* to return to Switch Menu or selecting either of the "ARROW" *Icons* will move through the tests. If any switches are stuck closed (or made from the presence of a pinball), the display sequences through the Switch Names, Return (Row) Wire, Drive (Column) Wire, Drive Transistor, Part Nº, and the "Pin-Outs" from the CPU/SOUND Board. This cycle continues until all switches are cleared or until the test is exited.

Dedicated Switch Test

To initiate, from the **SWITCH MENU**, select the "DED" *Icon* with either **Flipper Button** & press the **Start Button** (The service switches are deactivated during this test.). The display will describe the switch which includes the Switch Name, Return (Row) Wire, Drive (Column) Wire, Part Nº, and the "Pin-Outs" from the CPU/SOUND Board.

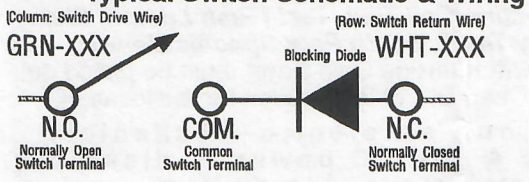
SWITCH MATRIX GRID & DEDICATED SWITCHES

Diode On Terminal Strip

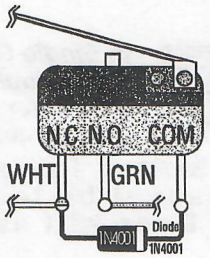
Row (Return) \ Column (Drive)	1: Q1 GRN-BRN CN5-P1	2: Q2 GRN-RED CN5-P3	3: Q3 GRN-ORG CN5-P4	4: Q4 GRN-YEL CN5-P5	5: Q5 GRN-BLK CN5-P6	6: Q6 GRN-BLU CN5-P7	7: Q7 GRN-VIO CN5-P8	8: Q8 GRN-GRY CN5-P9
1: U400 WHT-BRN CN7-P9	LEFT BUTTON (UK ONLY) on Cabinet side 1	NOT USED 9	LEFT 5-BANK BOTTOM Under P/F 17	RIGHT RAMP ENTER Above P/F 25	NOT USED 33	NOT USED 41	LEFT TURBO BUMPER Under P/F 49	LEFT OUTLANE Under P/F 57
2: U400 WHT-RED CN7-P8	4TH COIN SLOT On Coin Door 2	5-BALL TROUGH #1 (LEFT) Under P/F 10	LEFT 5-BANK #2 Under P/F 18	RIGHT RAMP EXIT Above P/F 26	RIGHT 3-BANK BOTTOM Under P/F 34	KENNY OPTO Under P/F 42	RIGHT TURBO BUMPER Under P/F 50	LEFT RETURN LANE Under P/F 58
3: U400 WHT-ORG CN7-P7	6TH COIN SLOT On Coin Door 3	5-BALL TROUGH #2 Under P/F 11	LEFT 5-BANK #3 Under P/F 19	NOT USED 27	RIGHT 3-BANK MIDDLE Under P/F 35	UNDER-TROUGH (TOILET) Under P/F 43	BOTTOM TURBO BUMPER Under P/F 51	LEFT SLINGSHOT Under P/F 59
4: U400 WHT-YEL CN7-P6	RIGHT COIN SLOT On Coin Door 4	5-BALL TROUGH #3 Under P/F 12	LEFT 5-BANK #4 Under P/F 20	NOT USED 28	RIGHT 3-BANK TOP Under P/F 36	UNDER-TROUGH (KENNY) Under P/F 44	NOT USED 52	RIGHT OUTLANE Under P/F 60
5: U401 WHT-GRN CN7-P5	CENTER COIN SLOT / DBA On Coin Door 5	5-BALL TROUGH #4 Under P/F 13	LEFT 5-BANK TOP Under P/F 21	NOT USED 29	POP BUMPER TARGET LT Under P/F 37	SVUK Under P/F DOTS 45	NOT USED 53	RIGHT RETURN LANE Under P/F 61
6: U401 WHT-BLU CN7-P3	LEFT COIN SLOT On Coin Door 6	5-BALL TROUGH VUK OPTO Under P/F 14	CENTER 3-BANK LEFT Under P/F 22	NOT USED 30	POP BUMPER TARGET RT Under P/F 38	VUK Under P/F DOTS 46	START BUTTON Cabinet Front 54	RIGHT SLINGSHOT Under P/F 62
7: U401 WHT-VIO CN7-P2	5TH COIN SLOT On Coin Door 7	5-BALL STACKING OPTO Under P/F 15	CENTER 3-BANK MIDDLE Under P/F 23	NOT USED 31	NOT USED 39	LEFT ORBIT (TO VUK) Under P/F 47	SLAM TILT On Coin Door 55	NOT USED 63
8: U401 WHT-GRY CN7-P1	RIGHT BUTTON (UK ONLY) on Cabinet side 8	SHOOTER LANE Under P/F DOTS 16	CENTER 3-BANK RIGHT Under P/F 24	NOT USED 32	NOT USED 40	UNDER-TROUGH SVUK Under P/F 48	PLUMB BOB TILT Inside Cabinet 56	NOT USED 64

IC U206 INPUTS \ GND	Ground BLK CN6-P1, -P11
1: U206 GRY-BRN CN6-P2	#1 LEFT FLIPPER BUTTON in Cabinet side DS-1
2: U206 GRY-RED CN6-P3	#2 LEFT FLIPPER E.O.S (End-of-Stroke) in Cabinet side DS-2
3: U206 GRY-ORG CN6-P4	#3 RIGHT FLIPPER BUTTON in Cabinet side DS-3
4: U206 GRY-YEL CN6-P6	#4 RIGHT FLIPPER E.O.S. (End-of-Stroke) in Cabinet side DS-4
5: U206 NOT USED GRY-GRN CN6-P7	NOT USED DS-5
6: U206 GRY-BLU CN6-P8	#6 VOLUME (RED BUTTON) (In Test: LEFT) on Coin Door DS-6
7: U206 GRY-VIO CN6-P9	#7 SERV. CRED. (GREEN BUTTON) (In Test: RIGHT) on Coin Door DS-7
8: U206 GRY-BLK CN6-P10	#8 BEGIN TEST (BLACK BUTTON) (In Test: ENTER) on Coin Door DS-8

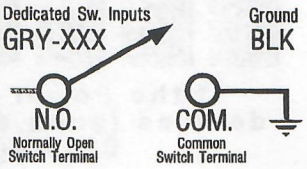
Typical Switch Schematic & Wiring

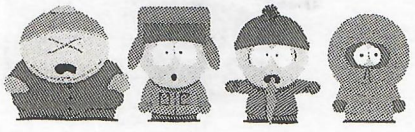


Note:
All Switches require diodes. Some diodes are located on Terminal Strips (under playfield) & not on the switch itself.
Diode On Terminal Strip



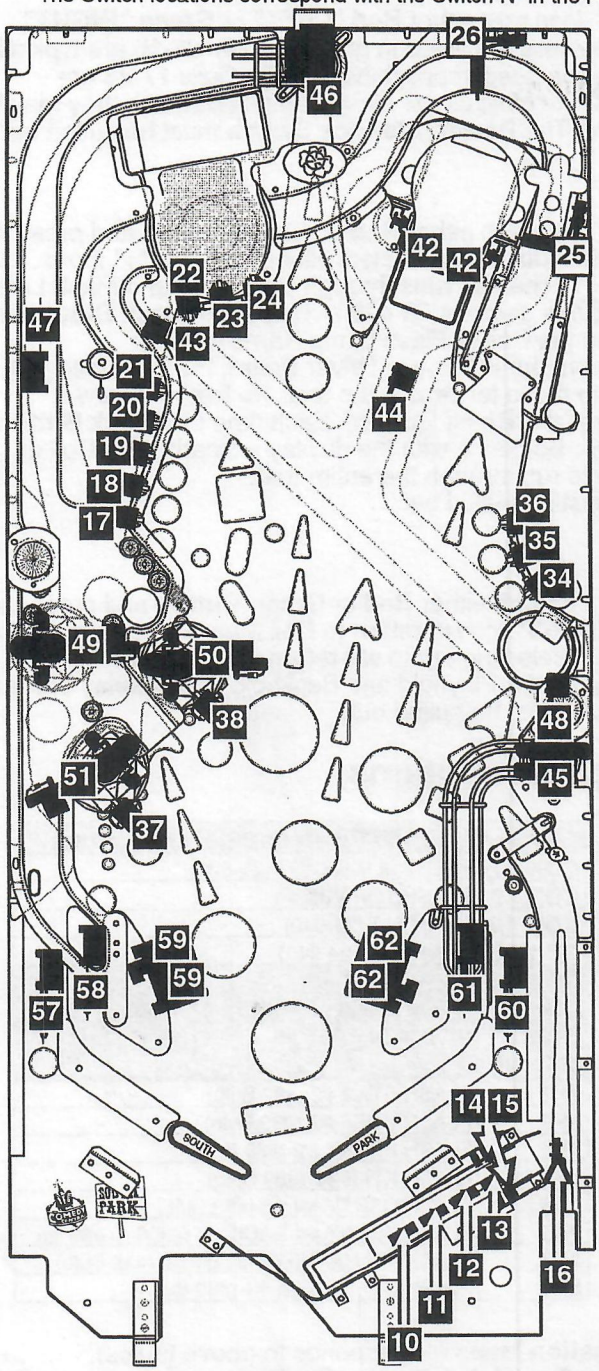
Dedicated Switch Schem.





Switch Matrix Grid Descriptions with Part Numbers and Locations

The Switch locations correspond with the Switch Nº in the Part Number Table shown & the Switch Matrix Grid (previous page).



Sw. Nº	Col. Nº	Row Nº	See Notes	Switch Matrix Description	Part Nº
				Note: The ¥ Coin Switch (for Japan) is 180-5091-00	
1	1	1		LT BUTTON (UK ONLY)	180-5160-00
2*	1	2		4TH COIN SLOT	180-5024-00
3*	1	3		*6TH COIN SLOT*	*(Future Use)*
4*	1	4		RIGHT COIN SLOT	180-5024-00
5*	1	5		CENTER COIN SLOT / DBA	
6*	1	6		LEFT COIN SLOT	
7*	1	7		*5TH COIN SLOT*	*(Future Use)*
8	1	8		RT BUTTON (UK ONLY)	180-5160-00
9	2	1		NOT USED	
10	2	2		5-BALL TROUGH #1 (LEFT)	180-5119-02
11	2	3		5-BALL TROUGH #2	
12	2	4		5-BALL TROUGH #3	
13	2	5		5-BALL TROUGH #4	
14	2	6	‡	5-BALL TROUGH VUK OPTO — BOT TRANS: / BOT REC:	520-5173-00 / 520-5174-00
15	2	7	‡	5-BALL STACKING OPTO — TOP TRANS: / TOP REC:	520-5173-00 / 520-5174-00
16	2	8	DOTS	SHOOTER LANE	180-5157-00
17	3	1	R	LEFT 5-BANK BOT. (Prp. Sq. Rear Mnt.)	500-6139-09R
18	3	2	R	LEFT 5-BANK #2 (Purple Sq. Rear Mnt.)	
19	3	3	R	LEFT 5-BANK #3 (Purple Sq. Rear Mnt.)	
20	3	4	R	LEFT 5-BANK #4 (Purple Sq. Rear Mnt.)	
21	3	5	R	LEFT 5-BANK TOP (Purp. Sq. Rear Mnt.)	
22	3	6	R	CENTER 3-BANK LT. (Grn. Nar. Rear Mnt.)	500-6138-04R
23	3	7		CENTER 3-BANK MID. (Red Rect. Fwd.)	500-6228-02
24	3	8		CENTER 3-BANK RT. (Grn. Narrow Fwd.)	500-6138-04
25	4	1		RIGHT RAMP ENTER	180-5087-00
26	4	2		RIGHT RAMP EXIT	
27	4	3		NOT USED	
28	4	4			
29	4	5			
30	4	6			
31	4	7			
32	4	8			
33	5	1			
34	5	2	R	RT 3-BANK BOT. (Flo.Grn. Rnd. Rear Mnt.)	500-6075-11R
35	5	3	R	RT 3-BANK MID. (Flo.Grn. Rnd. Rear Mnt.)	
36	5	4	R	RT 3-BANK TOP (Flo.Grn. Round Rear Mnt.)	
37	5	5		POP BUMPER TARGT LT (Flo. Grn. Sq.)	500-6139-11
38	5	6		POP BUMPER TARGT RT (Flo. Grn. Sq.)	
39	5	7		NOT USED	
40	5	8			
41	6	1			
42	6	2		KENNY (OPTO) — TRANS / REC	520-5082-00 / 520-5083-01
43	6	3		UNDERTROUGH (TOILET)	180-5057-00
44	6	4		UNDERTROUGH (KENNY)	
45	6	5	DOTS	SVUK (Super Vertical Up-Kicker Switch)	180-5052-00
46	6	6	DOTS	VUK (Vertical Up-Kicker Switch)	180-5116-01
47	6	7		LEFT ORBIT (TO VUK)	500-6227-02
48	6	8		UNDERTROUGH SVUK	180-5057-00
49	7	4		LEFT TURBO BUMPER	180-5015-03
50	7	2		RIGHT TURBO BUMPER	
51	7	3		BOTTOM TURBO BUMPER	
52	7	4		NOT USED	
53	7	5			
54*	7	6		START BUTTON (Red)	500-6090-02
55*	7	7		SLAM TILT (On Coin Door)	180-5022-00
56*	7	8		PLUMB BOB TILT — HANGER / CONTACT	535-5319-00 / 535-7563-01
57	8	1		LEFT OUTLANE (Rt. Mount R/O)	500-6227-02
58	8	2		LEFT RETURN LANE (Rt. Mnt. R/O)	
59	8	3		LEFT SLINGSHOT (Double-Switch)	180-5054-00
60	8	4		RIGHT OUTLANE (Rt. Mount R/O)	500-6227-02
61	8	5		RIGHT RETURN LANE	
62	8	6		RIGHT SLINGSHOT (Double-Switch)	180-5054-00
63	8	7		NOT USED	
64	8	8			

‡ Sw. 14 / Sw. 15 have both REC/TRANS on 1 board respectively.

" R ": The"R" following the Part Number on Stand-Up Targets means reverse (rear) mounted Target & Switch Actuator.

DOTS: Diode On Terminal Strip, if noted.

Legend Note:

☐ = Switches mounted above playfield.

■ = Switches mounted below playfield.

* The following switches are located in the cabinet and are not noted in the diagram above:

2 4 5 6 54 55 56

The following switches are not used:

9 27-33 39-41 52-53 63-64

Switches for UK only: 1 + 8

Go To Coil Menu

From the **DIAGNOSTICS MENU**, select the "COIL" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. The coils are listed in groups. Coils 01-16 are typically High Current Coils (although Low Current Coils may be used in positions 01-07). Coils 17-24 are typically Low Current Coils. The remaining positions (F1-F8) are typically for Flash Lamps (although they may be used any positions 01-24, read **Single Coil Test**). ***Important:*** The **Power Interlock Switch** must be pulled out.

Single Coil Test

To initiate, from the **COIL MENU**, select the "TEST" *Icon* with either **Red** or **Green Button** and press the **Black Button**. Ensure the **Power Interlock Switch** is pulled out. Select either the "-" or "+" *Icons*. Start with the "+" *Icon* to start the manual Coil Test from #1 (The test runs through Coils 1-24 and Flash Lamps F1-F8; *Note: Some Flash Lamps are used in Coil Positions; this game: #7 & #18.*). Press the **Black Button** on the "+" *Icon*, as each coil is selected, the display will describe the Coil or Flash Lamp Name with the corresponding number, the wire with colors, the "Pin-Outs" from the I/O Power Driver Board, the Coil Voltage & Gauge-Turns (e.g. 23-800). Press the **Black Button** again to move forward in the test. To test and view a particular Coil or Flash Lamp, select the "RUN" *Icon* and press the **Black Button**. Each time the **Black Button** is pushed, the Coil or Flash Lamp will fire on the Playfield and/or Backbox, with the display indicating the Coil or Flash Lamp information. Continue with the same procedure to run through the entire test.

Important: The **Power Interlock Switch** must be pulled out.

Cycling Coil Test

To initiate, from the **COIL MENU**, select the "CYC" *Icon* with either **Red** or **Green Button** and press the **Black Button**. If still in a previous test, select the "PREV" *Icon* to return to Coil Menu or selecting either of the "ARROW" *Icons* will move to Cycling Coil Test (selecting again will return to Coil Test). The test pulses each regular Coil or Flash Lamp sequentially (cycling) on the Playfield and Backbox. The display indicates "CYCLING COILS." ***Important:*** The **Power Interlock Switch** must be pulled out.

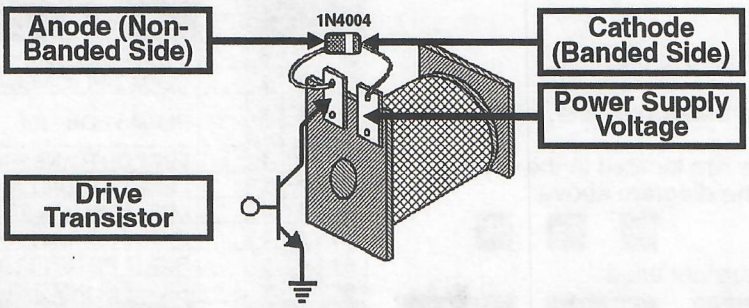
Coil & Flash Lamp Descriptions

Type	Coil / Flash Lamp Descriptions
COIL 1	TROUGH UP-KICKER (VUK) (26-1200)
COIL 2	AUTO LAUNCH (50V) (24-940)
COIL 3	SUPER VUK (24-940)
COIL 4	TOP VUK (26-1200)
COIL 5	TOILET SEAT LID (23-1100)
COIL 6	MR. HANKEY LATCH (29-1000)
COIL 7	FLASH POPS *4
COIL 8	(EUROPEAN TOKEN DISPENSER)
COIL 9	LEFT TURBO BUMPER (26-1200)
COIL 10	RIGHT TURBO BUMPER (26-1200)
COIL 11	BOTTOM TURBO BUMPER (26-1200)
COIL 12	LEFT SLINGSHOT (23-800)
COIL 13	MR. HANKEY (DOWN) (23-1100)
COIL 14	KENNY PIVOT (DEAD) (22-1080)
COIL 15	LEFT FLIPPER [50V RED/YEL] (23-1100)
COIL 16	RIGHT FLIPPER [50V RED/YEL] (23-1100)

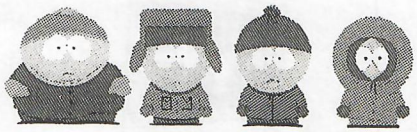
Type	Coil / Flash Lamp Descriptions
COIL 17	RIGHT SLINGSHOT (23-800)
COIL 18	FLASH TOP VUK *1
COIL 19	KENNY LT (24-940)
COIL 20	KENNY RT (24-940)
COIL 21	LT OUTLANE (UK ONLY) (28-1050)
COIL 22	RT OUTLANE (UK ONLY) (28-1050)
COIL 23	UP/DOWN POST (UK ONLY) (23-1100)
COIL 24	(OPTIONAL COIN METER)
#F1	FLASH STAN *2 (#89 Bulb)
#F2	FLASH CHEF *2 (#89 Bulb)
#F3	FLASH KENNY *2 (#89 Bulb)
#F4	FLASH KYLE *2 (#89 Bulb)
#F5	FLASH CARTMAN *2 (#89 Bulb)
#F6	FLASH KENNY *1 BACK *2 (#906 (1) #89 (2))
#F7	FLASH MR HANKEY/TOILET *2 (#89 Bulb)
#F8	FLASH SUPER VUK *1 (#89 Bulb)

See the next three (3) pages for the **Coil & Flash Lamp Location Maps** (corresponds to above tables), **Coils Detailed Chart Table** & the **Backbox I/O Power Driver Board Detailed Wiring Diagram**.

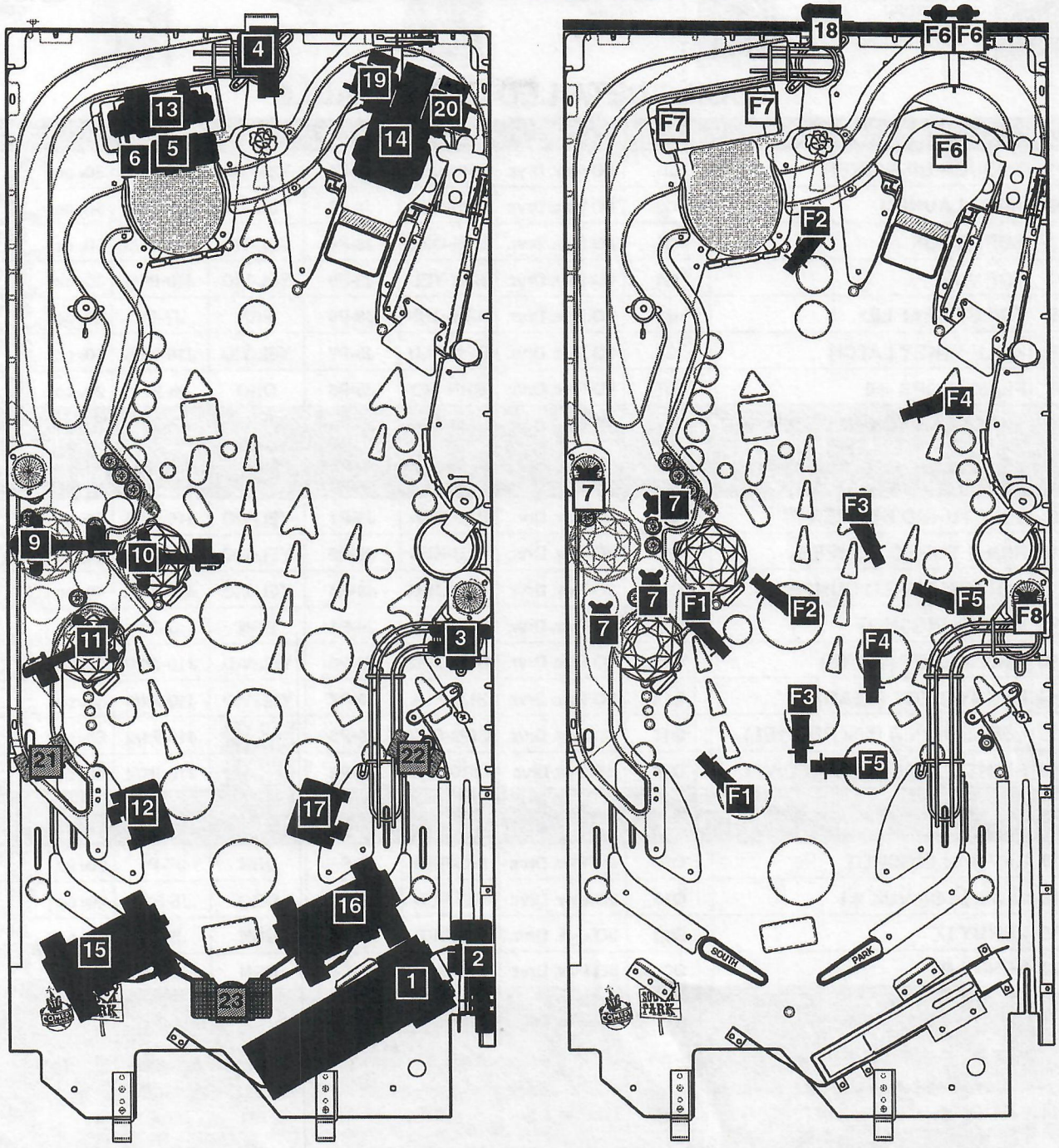
Typical Coil Wiring



Note:
All Coils require diodes. Some diodes are located on Terminal Strips (under playfield) & not on the coil itself.
D iode
O n
T erminal
S trip



Coil & Flash Lamp Locations



Use the previous page and the following two (2) pages in conjunction with above Coil and Flash Lamp Maps.

Legend Note:

☐ = Coils and Flash Lamps mounted above playfield.

■ = Coils and Flash Lamps mounted below playfield.

The following Bulb Type is used for Flash Lamps:

#89 Bulb
(Bayonet)
165-5000-89

#906 Bulb
(Wedge Base)
165-5004-00

*The following Coils are optional for **UK Only:***

21 22 23

The following Coils are Optional:

08 24

In Portals™ GO TO DIAGNOSTICS MENU →

Menu GO TO COIL MENU →

Menu GO TO COIL TEST →

Menu GO TO CYCLING COILS

COILS DETAILED CHART TABLE

High Current Coils Group 1		Drive Transistor (D.T.)	Driver Ouput Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connnection	Power Voltage	Coil GA/Turn or Bulb Type
#1	TROUGH UP-KICKER	Q1	I/O Pwr. Drvr.	BRN-BLK	J8-P1	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#2	AUTO LAUNCH	Q2	I/O Pwr. Drvr.	BRN-RED	J8-P3	YEL-VIO	J10-P4/5	50v DC	24-940 090-5036-00T
#3	SUPER VUK	Q3	I/O Pwr. Drvr.	BRN-ORG	J8-P4	YEL-VIO	J10-P4/5	50v DC	24-940 090-5036-00T
#4	TOP VUK	Q4	I/O Pwr. Drvr.	BRY-YEL	J8-P5	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#5	TOILET SEAT LID	Q5	I/O Pwr. Drvr.	BRN-GRN	J8-P6	BRN	J7-P1	20v DC	23-1100 090-5030-00T
#6	MR. HANKEY LATCH	Q6	I/O Pwr. Drvr.	BRN-BLU	J8-P7	YEL-VIO	J10-P4/5	50v DC	29-1000 090-5059-00
#7	FLASH POPS *4	Q7	I/O Pwr. Drvr.	BRN-VIO	J8-P8	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#8	EUROPEAN TOKEN DISPENSER	Q8	I/O Pwr. Drvr.	BRN-GRY	J8-P9	YEL-VIO	J10-P4/5	50v DC	DL4SS 515-6076-01

High Current Coils Group 2		Drive Transistor (D.T.)	Driver Ouput Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connnection	Power Voltage	Coil GA/Turn
#9	LEFT TURBO BUMPER	Q9	I/O Pwr. Drvr.	BLU-BRN	J9-P1	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#10	RIGHT TURBO BUMPER	Q10	I/O Pwr. Drvr.	BLU-RED	J9-P2	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#11	BOTTOM TURBO BUMPER	Q11	I/O Pwr. Drvr.	BLU-ORG	J9-P4	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#12	LEFT SLINGSHOT	Q12	I/O Pwr. Drvr.	BLU-YEL	J9-P5	BRN	J7-P1	20v DC	23-800 090-5001-00T
#13	MR. HANKEY (DOWN)	Q13	I/O Pwr. Drvr.	BLU-GRN	J9-P6	YEL-VIO	J10-P4/5	50v DC	23-1100 090-5030-00T
#14	KENNY PIVOT (DEAD)	Q14	I/O Pwr. Drvr.	BLU-BLK	J9-P7	YEL-VIO	J10-P4/5	50v DC	22-1080 090-5032-00T
#15	LEFT FLIPPER (50v RED/YEL)	Q15	I/O Pwr. Drvr.	ORG-GRY	J9-P8	RED-YEL GRY-YEL	J10-P1/2	50v DC	23-1100 090-5030-00T
#16	RIGHT FLIPPER (50v RED/YEL)	Q16	I/O Pwr. Drvr.	ORG-VIO	J9-P9	RED-YEL BLU-YEL	J10-P1/2	50v DC	23-1100 090-5030-00T

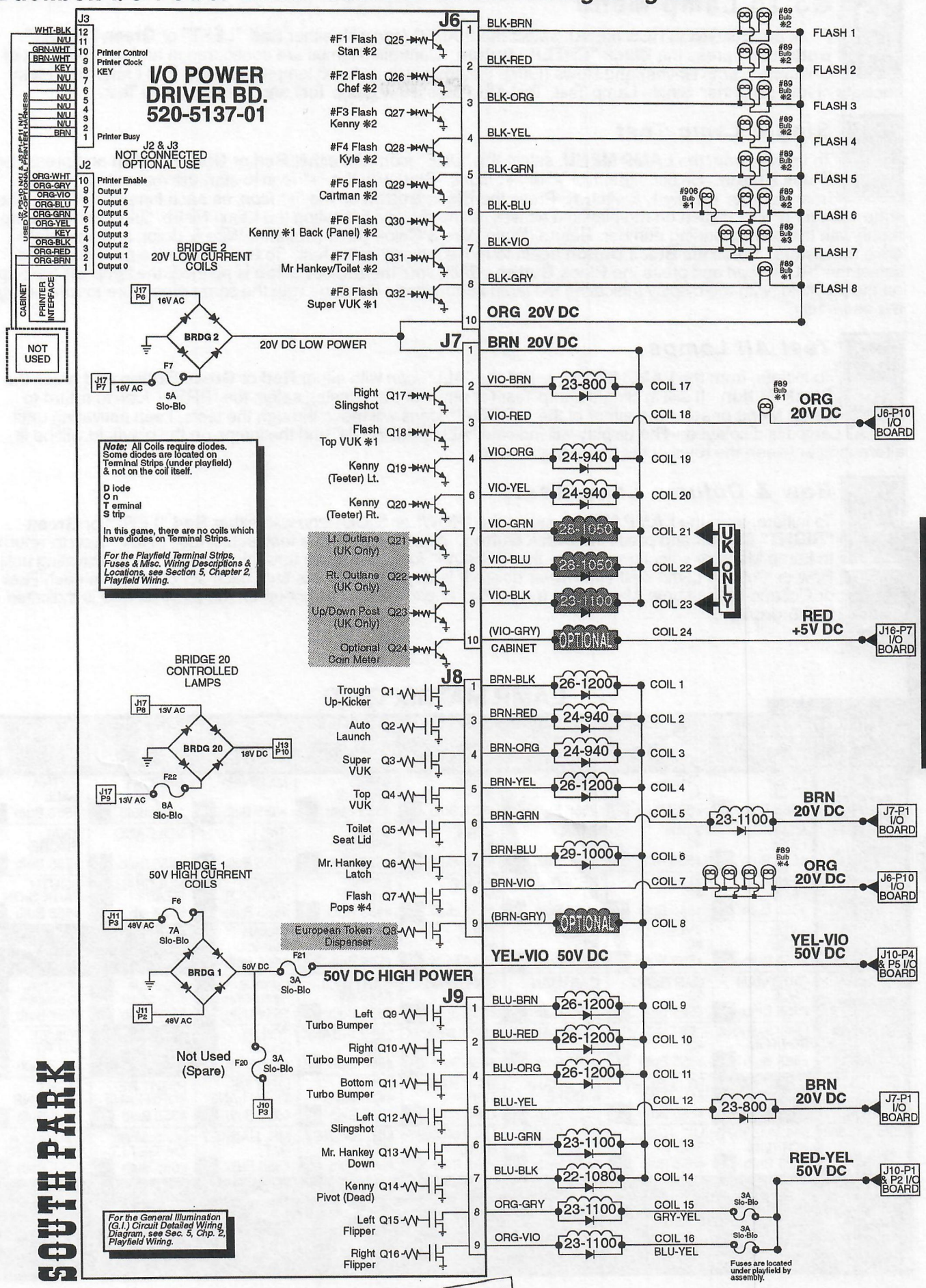
Low Current Coils Group 1		Drive Transistor (D.T.)	Driver Ouput Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connnection	Power Voltage	Coil GA/Turn Bulb or Meter
#17	RIGHT SLINGSHOT	Q17	I/O Pwr. Drvr.	VIO-BRN	J7-P2	BRN	J7-P1	20v DC	23-800 090-5001-00T
#18	FLASH TOP VUK *1	Q18	I/O Pwr. Drvr.	VIO-RED	J7-P3	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#19	KENNY LT	Q19	I/O Pwr. Drvr.	VIO-ORG	J7-P4	BRN	J7-P1	20v DC	24-940 090-5036-00T
#20	KENNY RT	Q20	I/O Pwr. Drvr.	VIO-YEL	J7-P6	BRN	J7-P1	20v DC	24-940 090-5036-00T
#21	LT OUTLANE (UK ONLY)	Q21	I/O Pwr. Drvr.	VIO-GRN	J7-P7	BRN	J7-P1	20v DC	28-1050 090-5046-00
#22	RT OUTLANE (UK ONLY)	Q22	I/O Pwr. Drvr.	VIO-BLU	J7-P8	BRN	J7-P1	20v DC	28-1050 090-5046-00
#23	UP/DOWN POST (UK ONLY)	Q23	I/O Pwr. Drvr.	VIO-BLK	J7-P9	BRN	J7-P1	20v DC	23-1100 090-5030-00T
#24	OPTIONAL COIN METER	Q24	I/O Pwr. Drvr.	VIO-GRY	J7-P10	RED	J16-P7	5v DC	Meter 5v 091-5000-00

D iode O n T erminal S trip (if noted)

Flash Lamps (FLASH)		Drive Transistor (D.T.)	Driver Ouput Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connnection	Power Voltage	Bulb Type
#F1	FLASH STAN *2	Q25	I/O Pwr. Drvr.	BLK-BRN	J6-P1	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#F2	FLASH CHEF *2	Q26	I/O Pwr. Drvr.	BLK-RED	J6-P2	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#F3	FLASH KENNY *2	Q27	I/O Pwr. Drvr.	BLK-ORG	J6-P3	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#F4	FLASH KYLE *2	Q28	I/O Pwr. Drvr.	BLK-YEL	J6-P4	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#F5	FLASH CARTMAN *2	Q29	I/O Pwr. Drvr.	BLK-GRN	J6-P5	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#F6	FLASH KENNY *1 — BACK *2	Q30	I/O Pwr. Drvr.	BLK-BLU	J6-P6	ORG	J6-P10	20v DC	#906 Bulb 165-5004-00 / #89 Bulb 165-5000-89
#F7	FLASH MR HANKEY/TOILET *3	Q31	I/O Pwr. Drvr.	BLK-VIO	J6-P7	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#F8	FLASH SUPER VUK *1	Q32	I/O Pwr. Drvr.	BLK-GRY	J6-P8	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89

Note: In Test Flash Lamps Menu ("Flash" icon), Flashers tested are Flash Lamps F1-F8 ONLY. Test all others in Single or Cycling Coil Tests.

Backbox I/O Power Driver Board Detailed Wiring Diagram



Go To Lamp Menu

From the **DIAGNOSTICS MENU**, select the "LAMP" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. Controlled lamps are configured in and 8 x 10 Matrix of Columns (Lamp Drives) and Rows (Lamp Returns) with up to 80 lamps possible. The Lamp Test Menu consists of four (4) parts: Single Lamp Test, Test All Lamps, Row Lamp Test and Column Lamp Test.

Single Lamp Test

To initiate, from the **LAMP MENU**, select the "ONE" *Icon* with either **Red** or **Green Button** and press the **Black Button**. Select either the "-" or "+" *Icons*. Start with the "+" *Icon* to start the manual Lamp Test from Column 1, Row 1, Switch 1. Press the **Black Button** on the "+" *Icon*, as each lamp is selected, the lamp will light at it's location on the playfield as well as the display, indicating the Lamp Matrix Grid Position, lamp name with the corresponding number, Return (Row) Wire & Color, Drive (Column) Wire & Color, and associated drive transistors. Press the **Black Button** again to move forward in the test. To test and view a particular lamp, select the "RUN" *Icon* and press the **Black Button**. Each time the **Black Button** is pushed, the lamp will light-up on the playfield, with the display indicating the lamp information. Continue with the same procedure to run through the entire test.

Test All Lamps

To initiate, from the **LAMP MENU**, select the "ALL" *Icon* with either **Red** or **Green Button** and press the **Black Button**. If still in Single Lamp Test (or any 1 of the 4 tests), select the "PREV" *Icon* to return to Lamp Menu or selecting either of the "ARROW" *Icons* will move through the tests, keep activating until Test All Lamps is displayed. The display will indicate "ALL LAMPS ON" and the lamps on the playfield will be lit, alternating between the rows in the Lamp Matrix Grid.

Row & Column Lamp Tests

To initiate, from the **LAMP MENU**, select the "ROW" or "COL" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black Button**. If still in a previous test, select the "PREV" *Icon* to return to Lamp Menu or selecting either of the "ARROW" *Icons* will move through the tests, keep activating until Row or Column Lamp Test (whichever desired) is displayed. In this test, each set of lamps in each Row or Column of the Lamp Matrix Grid (respective to each test) will light-up on the playfield and is indicated in the display.

LAMP MATRIX GRID

D iode O n T erminal S trip

Row (GND) \ Column (18v)	1: U17 YEL-BRN J13-P9	2: U16 YEL-RED J13-P8	3: U15 YEL-ORG J13-P7	4: U14 YEL-BLK J13-P6	5: U13 YEL-GRN J13-P5	6: U12 YEL-BLU J13-P4	7: U11 YEL-VIO J13-P3	8: U10 YEL-GRY J13-P1
1: Q33 RED-BRN J12-P1	CHEF FACE #555 Bulb 1	CHEF #2 #555 Bulb 2	CHEF #3 #555 Bulb 3	CHEF #4 #555 Bulb 4	CHEF ARROW #555 Bulb 5	MYSTERY #555 Bulb 6	SPOOKY VISION #555 Bulb 7	EXTRA BALL #555 Bulb 8
2: Q34 RED-BLK J12-P2	STAN FACE #555 Bulb 9	STAN #2 #555 Bulb 10	STAN #3 #555 Bulb 11	STAN #4 #555 Bulb 12	STAN ARROW #555 Bulb 13	SKILL SHOT #555 Bulb 14	VOLCANO #555 Bulb 15	ANAL PROBE #555 Bulb 16
3: Q35 RED-ORG J12-P3	KENNY FACE #555 Bulb 17	KENNY #2 #555 Bulb 18	KENNY #3 #555 Bulb 19	KENNY #4 #555 Bulb 20	KENNY ARROW #555 Bulb 21	SUPER JACKPOT DOTS #555 Bulb 22	MULTIBALL READY DOTS 555# ulb 23	SOUTH PARK SIGN #555 Bulb 24
4: Q36 RED-YEL J12-P4	KYLE FACE #555 Bulb 25	KYLE #2 #555 Bulb 26	KYLE #3 #555 Bulb 27	KYLE #4 #555 Bulb 28	KYLE ARROW #555 Bulb 29	KENNY ASSEMBLY DOTS #555 Bulb 30	NOT USED 31	NOT USED 32
5: Q37 RED-GRN J12-P5	CARTMAN FACE #555 Bulb 33	CARTMAN #2 #555 Bulb 34	CARTMAN #3 #555 Bulb 35	CARTMAN #4 #555 Bulb 36	CARTMAN ARROW #555 Bulb 37	LEFT TUR-BO BUMPER DOTS 555# Bulb 38	RIGHT TUR-BO BUMPER DOTS 555# Bulb 39	BTTM TUR-BO BUMPER DOTS 555# Bulb 40
6: Q38 RED-BLU J12-P6	LEFT 5-BANK BOTTOM #555 Bulb 41	LEFT 5-BANK #2 #555 Bulb 42	LEFT 5-BANK #3 #555 Bulb 43	LEFT 5-BANK #4 #555 Bulb 44	LEFT 5-BANK TOP #555 Bulb 45	TOILET S-U LT DOTS #555 Bulb 46	NOT USED 47	TOILET S-U RT DOTS #555 Bulb 48
7: Q39 RED-VIO J12-P8	NOT USED 49	RT. 3-BANK BOTTOM #555 Bulb 50	RT. 3-BANK MIDDLE #555 Bulb 51	RT. 3-BANK TOP #555 Bulb 52	LEFT OUTLANE #555 Bulb 53	LEFT RE-TURN LANE #555 Bulb 54	RIGHT RE-TURN LANE #555 Bulb 55	RIGHT OUTLANE #555 Bulb 56
8: Q40 RED-GRY J12-P9	MR. HANKEY: BOTTOM #555 Bulb 57	MR. HANKEY: BODY #555 Bulb 58	MR. HANKEY: LT HAND #555 Bulb 59	MR. HANKEY: RT HAND #555 Bulb 60	MR. HANKEY: HEAD #555 Bulb 61	MR. HANKEY: HAT #555 Bulb 62	POP BUMPER TARGET LT #555 Bulb 63	POP BUMPER TARGET RT #555 Bulb 64
9: Q41 NOT USED RED-WHT J12-P10	NOT USED 65	NOT USED 66	NOT USED 67	NOT USED 68	NOT USED 69	NOT USED 70	NOT USED 71	NOT USED 72
10: Q42 NOT USED RED J12-P11	NOT USED 73	NOT USED 74	NOT USED 75	NOT USED 76	NOT USED 77	NOT USED 78	NOT USED 79	NOT USED 80

Lamp Matrix Grid Locations

The lamp locations correspond with the Lamp Nº in the Lamp Matrix Grid on the previous page.

Legend Note:

☐ = Lamps mounted above playfield.

■ = Lamps mounted below playfield.

The following Lamps are not used:

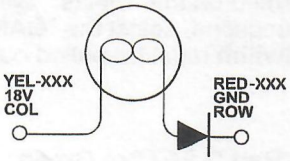
31 - 32 | 47 | 49 | 65 - 80

The following Bulbs are used in the Lamp Matrix Grid (See Table Grid on previous page for details):

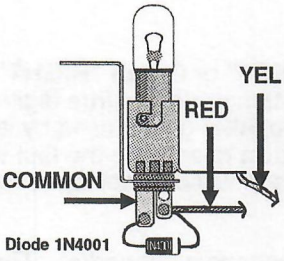
#555 Bulb (Wedge)
165-5002-00

#44 Bulb (Bayonet)
165-5000-44

Typical Lamp Schematic

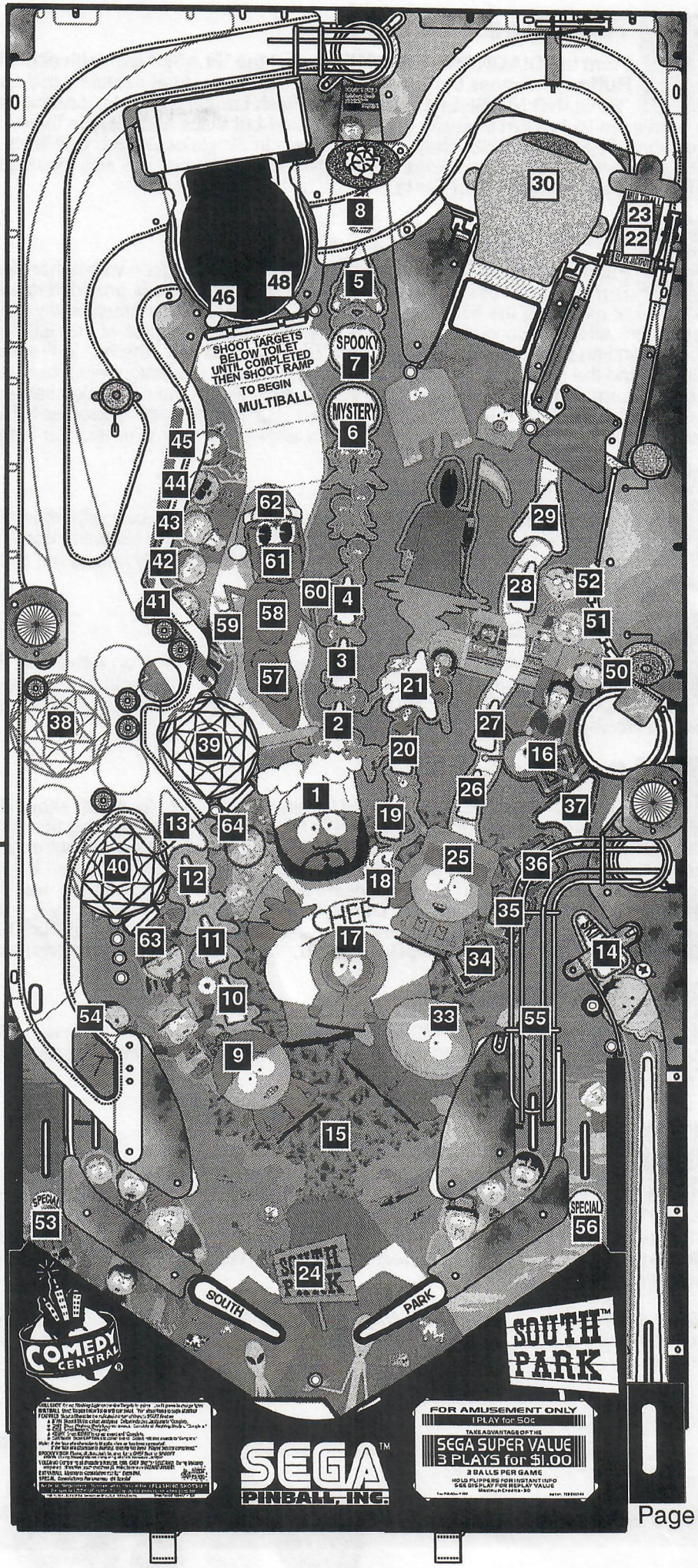


Typical Lamp Wiring



Note:
All Lamps require diodes. Some diodes are located on Terminal Strips (under playfield) & not on the lamp itself.

D iode
O n
T erminal
S trip

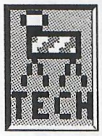


Test Flash Lamps

From the **DIAGNOSTICS MENU**, select the "FLASH" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. After selecting this *Icon* the display will indicate "CYCLING FLASHERS" and all the Flash Lamps will cycle continuously until the test is exited. This test is allows the technician to easily spot any burned-out bulbs and replace them. Flashers tested are Flash Lamps in Positions F1-F8 (Q25-Q32) Only. Test all others in Single or Cycling Coil Tests. ***Important:*** The **Power Interlock Switch** must be pulled out. ***Note:*** In this game Flash Lamps are also located in Coil Positions #6 & #7. **TO TEST USE Single** or **Cycling Coil Tests**.

Clear Ball Trough

From the **DIAGNOSTICS MENU**, select the "CLR" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. This is provided to allow the technician a simple method of removing the balls from the trough and also, to test functionality of the trough, ensuring proper trough operation. After selecting this *Icon* the display will show a graphic of the ball trough with balls in the trough with it's corresponding switch number. Select the "RUN" *Icon* to eject the ball in the first position. Simultaneously, the display and the playfield will eject the ball to the Trough Up-Kicker, eject from the Trough Up-Kicker into the Shooter Lane and will be ejected onto the playfield where the technician can easily retrieve the pinball or allow the ball(s) to re-enter the trough to continue Clear Ball Trough Test. ***Important:*** The **Power Interlock Switch** must be pulled out. ⚠ **Caution:** *Continuous use of above test may overheat the Trough Up-Kicker Coil.* ⚠



Technician Alert

From the **DIAGNOSTICS MENU**, select the "TECH" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. After selecting this *Icon* the display will indicate if there are any faulty switches (i.e., switches that are normally closed but remain open or open switches that have not been closed (activated) in 50 games.)

Service Phone

From the **DIAGNOSTICS MENU**, select the "SERV" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. After selecting this *Icon* the display will indicate a phone number to call if technical assistance is required (the phone number is different for each *Country Dip Switch Setting*).

Begin Play Test

From the **DIAGNOSTICS MENU**, select the "PLAY" *Icon* with either **Red "LEFT"** or **Green "RIGHT"** Button and press the **Black "ENTER" Button**. After selecting this *Icon* the technician can test certain play functions to insure all switch activated coils function without entering game play. For example, by rolling the ball over the Shooter Lane switch, the Autoplunger should fire. If it kicks to early or too late, the switch actuator should be adjusted to compensate for this error. If it fails to fire, use the Switch Test or Coil Test to help determine the cause of the failure. During this function, similar tests may be performed on the "Ejects", Slingshots, Vertical Up-Kickers, Pop Bumpers, etc. in the game. For unique Play Test functions, select the "GAME SPECIFIC" *Icon* in the **DIAGNOSTICS MENU**. ***Important:*** The **Power Interlock Switch** must be pulled out.

Fire Knocker

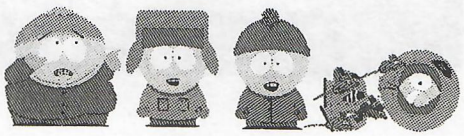
From the **DIAGNOSTICS MENU**, select the "KNOCKER" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. The digitally mastered "Knocker" is sounded.

Sound / Speaker Test

From the **DIAGNOSTICS MENU**, select the "SPKR" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. The BSMT 2000 Sound System produces true digital stereo sound from Backbox & Cabinet Speakers or *"Mono"* on the Cabinet Speaker (when used by itself). After selecting this *Icon*, select the "-" or "+" *Icons* and press the **Black "ENTER" Button** to activate the first test. Repeat to visually see & hear all tests. Select the "RUN" *Icon* to activate the test chosen without moving to the next test.

Note: *During Sound Tests, the display shows the speaker identification and the corresponding sound(s). The sound functions allow verification that both channels are functioning properly & that the speaker connections are correct.*

Sound / Speaker Test Continued Next Page



Speaker Phase Testing

Continued

Connections to each of speakers are polarized and each must be connected appropriately for the best quality sound. If one speaker has the positive and negative connections reversed with respect to the other one, bass frequencies will not be produced properly and the overall sound quality will be poor. To test for proper speaker phasing, use the sound test to cycle through the Backbox & Cabinet, and Backbox Sine (repeated) functions. If the Cabinet Sine produces more volume and bass than the Left Sine, the speakers are connected properly. If it produces the same or less, one speaker is connected improperly. To isolate and correct reversed speaker connections, one of two methods may be used.

1. Check each speaker for polarity markings. If the speakers have polarity markings, verify that the Backbox Speaker RED/WHT Wire and the Cabinet Speaker YEL/WHT Wire is connected to the negative (-) terminal.

2. Disconnect the speaker output connector from the CPU / Sound Board and connect a 1.5-volt battery across each speaker pair one at a time while observing the speakers. Make sure the positive battery terminal is connected to the positive lead (CN4, Pin-3 (RED/BLK) or Pin-6 (YEL/BLK)) each time. As the connection is made, check speaker cone movement; proper connections are indicated by outward movement.

Auto / Manual Tests	Sounds Produced
Speaker Test	Tone
Sound/OPSYS EPROM (Loc. U7)	Level 1-3 (Music Test)
Voice ROM 1 (Loc. U17)	Speech Pattern 1
Voice ROM 2 (Loc. U21)	Speech Pattern 2
Voice ROM 3 (Loc. U36)	Speech Pattern 3
Voice ROM 4 (Loc. U37)	Speech Pattern 4

Note: Voice ROMs 1 - 4 = 8MB. The CPU/Sound Board must have a Jumper at W6 to accept 8MB ROMs.

Begin Burn In

From the **DIAGNOSTICS MENU**, select the "BURN" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. After selecting this *Icon* the Begin Burn-In Test will start. At this stage the game will exercise all CPU I/O Functions (Dot Matrix Display Test, Coil Testing, Lamp Testing, Sound, etc.). This is provided to constantly exercise sounds, coils, etc... Cumulative Burn-In minutes will be displayed. To reset Burn-In minutes to 00, select the "RESET" *Icon* in the **MAIN MENU** and select the "FACT" *Icon* (Factory Reset). See Chapter 5, Go To Reset Menu, of this section.

Dot Matrix Test

From the **DIAGNOSTICS MENU**, select the "DOT TEST" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. After selecting this *Icon* the Dot Matrix Test immediately begins. The display will immediately illuminate & cycle for 1 pass of each test continuously for each of the following tests:

1. Illuminates 1 vertical column of dots, turning it off & illuminating the next column, until each column has been individually lit, while the other columns are off.
2. Illuminates 1 horizontal row of dots, turning it off & illuminating the next row, until each row has been individually lit, while the other rows are off.
3. Illuminates all the dots, except for one column from left to right.
4. Illuminates all the dots, except for one row from top to bottom.
5. Illuminates every other dot lit, in both the rows and columns.
6. Illuminates all dots at 30%, 70% & 100% brightness.

Note: Pressing any button will exit the test & return to **DIAGNOSTICS MENU**.

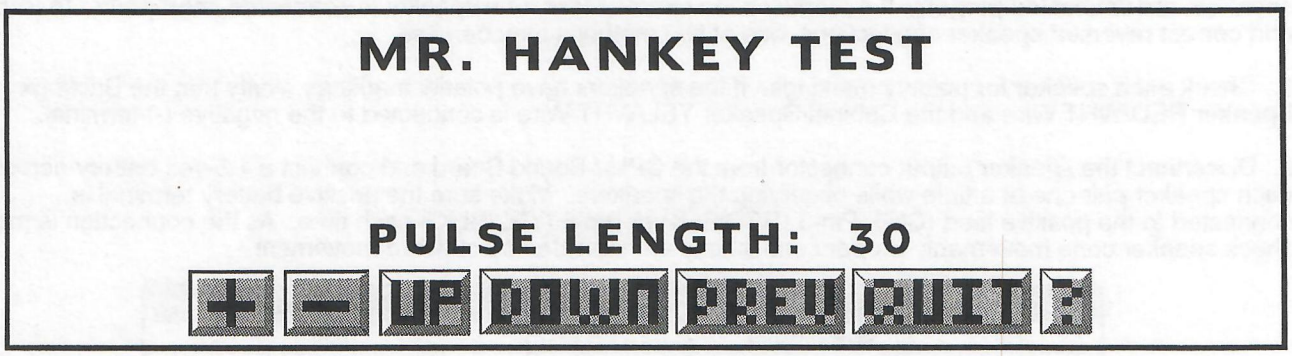
Dot Matrix Display Explained

The display utilizes a Micro-Processor Control Board mounted in piggyback fashion to the Dot Matrix Display (128 X 32) Driver Board. The purpose behind this board is to provide more information to the operator as well as displaying graphics to the player.

The board is controlled by a 6809E Microprocessor and its personality ROM (Unique to the Game). It receives Data, Reset & Clock Information from the CPU/Sound Board via the ribbon cable and sends back multiple Status and Busy Signals to the CPU. This is to insure synchronized communication between the CPU and the Display Controller Board. The Drivers for the rows and columns are provided on 5 surface mounted integrated circuits on the Dot Matrix Display Driver Board.

South Park Specific (Mr. Hankey Test)

To initiate, from the **DIAGNOSTICS MENU**, select the "PARK" *Icon* with either the **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. This will bring up the **SOUTH PARK SPECIFIC MENU**. Similiar to "BEGIN PLAY TEST," this menu is used to test and adjust Game Specific Features. The feature in this game is **MR. HANKEY TEST**.



This test allows you to operate the **MR. HANKEY LATCH (Coil Q6)** [UP] and the **MR. HANKEY (DOWN) (Coil Q13)** [DOWN] outside of Game Mode for the purpose of troubleshooting and adjustment.

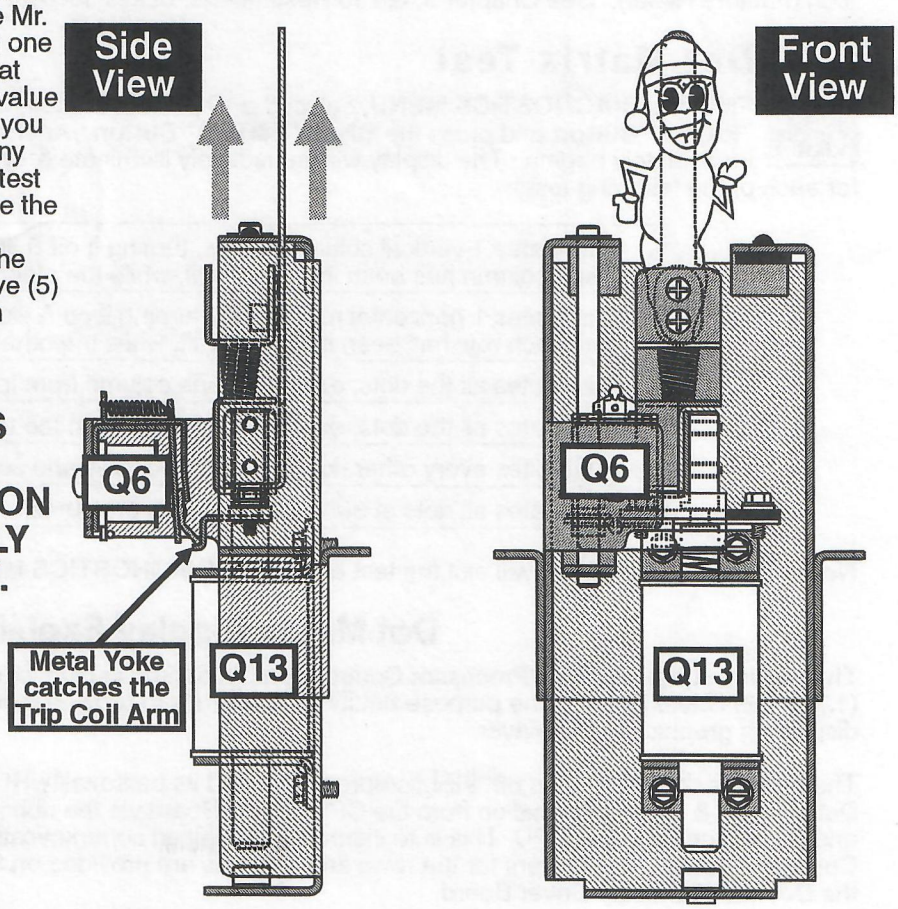
Test Procedure:

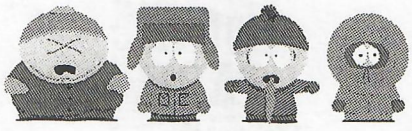
Select the "UP" *Icon* with either the **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. This will energize the **MR. HANKEY LATCH** Coil (**Q6**) releasing the spring loaded Mr. Hankey Device. Select the "DOWN" *Icon* with either the **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. The **MR. HANKEY (DOWN)** Coil (**Q13**) will energize, pulling Mr. Hankey back into the Toilet Tank and re-latching the assembly (...the Metal Yoke on the Plunger catches under the Trip Coil Arm Assembly.).

Adjustment Procedure:

Using the + or - Icons you can vary the strength of the [**DOWN**] Coil (**Q13**) (the Display will indicate this.). The ***Adjustment Range*** is **10 (SOFT)** to **60 (HARD)**. The **Factory Setting is 30**. Your goal is to have the [**DOWN**] Coil pull the Mr. Hankey Assembly into the Toilet Tank in one ***PULSE*** (with no "chattering"). Starting at the lowest value of "10", increment the value by two (2) (e.g. 10-12, 12-14, etc.) until you get a smooth "One-Shot-Pull" without any chattering. Select the "DOWN" *Icon* to test the "pull"; select the "UP" *Icon* to release the Mr. Hankey Assembly so you may try another Pulse Length, if desired. Test the action of this assembly a minimum of five (5) times ensuring each time was a smooth "One-Shot-Pull."

BEFORE EXITING THIS MENU, ENSURE YOU SELECT THE "DOWN" ICON TO PULL THE ASSEMBLY BACK INTO THE TANK.





Dr. Pinball (Flow Chart Menus)

To initiate, from the **DIAGNOSTICS MENU**, select the Cross "DR." *Icon* with either the **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. This will bring you (the operator / technician) into **DR. PINBALL** (Flow Chart Menus) which offers you a choice of three sub-menus: Coil "DR.," Switch "DR." and Lamp "DR." *Icons.* Selecting a particular sub-menu will give you a choice of which specific Coil (any and all coil assemblies such as Flippers, VUKs, Magnets, etc.), Switch or Lamp circuit needs to be diagnosed. The display will now ask a question or give a procedure to follow such as "Does the lamp turn on?" or "Check bridge rectifier BR-20, if short replace." When Dr. Pinball asks a question or request a procedure the Dr. will expect a response such as "no" or "yes" (see below examples of the *Mini-Icons* which will prompt the operator). You the operator/technician must respond by using your **Flipper Buttons** to "SELECT" a *Mini-Icon* and the **Start Button** to "ENTER" your selection.

The following are the *Mini-Icons* with explanations for the Dr. Pinball Sub-Menus to follow:

→ Select a Coil, Lamp or Switch to diagnose with "-" or "+" *Icon*; Then select the "RUN" *Icon* to activate the choice.
"PREV" goes back to previous question.
"QUIT" exits Portals completely.
Help "?" gives direction on button usage.

→ Seen when question is being asked on the Display. Select "YES" or "NO" to answer question given.
"END" lets you select a new item to test.
"PREV", "QUIT" and "?" (see first example above).

→ Seen when diagnosis is given. Select any *Icon* for your next step.
"END" lets you select a new item to test.
"PREV", "QUIT" and "?" (see first example above).

→ In Coil Flow Chart Menu, select "PULSE" to pulse the coil selected.
"END" lets you select a new item to test.
"PREV", "QUIT" and "?" (see first example above).

Coil Flow Chart

To initiate, from the **DR. PINBALL MENU**, select the Coil "DR." *Icon* with either the **Red** or **Green Button** and press the **Black Button**. This is the Coil Flow Chart. Follow the questions, answering by using the *Mini-Icons* in the display.

Switch Flow Chart

To initiate, from the **DR. PINBALL MENU**, select the Switch "DR." *Icon* with either the **Red** or **Green Button** and press the **Black Button**. This is the Switch Flow Chart. Follow the questions, answering by using the *Mini-Icons* in the display.

Lamp Flow Chart

To initiate, from the **DR. PINBALL MENU**, select the Lamp "DR." *Icon* with either the **Red** or **Green Button** and press the **Black Button**. This is the Lamp Flow Chart. Follow the questions, answering by using the *Mini-Icons* in the display.

SOUTH PARK
GAME AUDIT TABLE

SEGA PINBALL, INC.

Copy for Field Audit Tracking Performance (Use blank columns to fill-in Audit Info.).

Earnings Audits 1-12

	Audit Name	Fill-In		Audit Name	Fill-In		Audit Name	Fill-In
1	TOTAL PAID CREDITS		5	COINS THRU LEFT SLOT		9	TOTAL COINS	
2	FREE GAME PERCENTAGE		6	COINS THRU RIGHT SLOT		10	TOTAL EARNINGS	
3	AVERAGE BALL TIME		7	COINS THRU CENTER SLOT		11	METER CLICKS	
4	AVERAGE GAME TIME		8	COINS THRU 4TH SLOT		12	SOFTWARE METER	

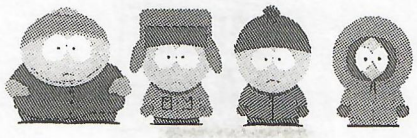
Sega Audits 13-55

	Audit Name	Fill-In		Audit Name	Fill-In		Audit Name	Fill-In
13	TOTAL BALLS PLAYED		28	20M—49.9M SCORES		43		
14	TOTAL EXTRA BALLS		29	50M—69.9M SCORES		44		
15	EXTRA BALL PERCENT		30	70M—99.9M SCORES		45		
16	REPLAY 1 AWARDS		31	100M—129.9M SCORES		46		
17	REPLAY 2+ AWARDS		32	130M+ SCORES		47		
18	TOTAL REPLAYS		33	AVERAGE SCORES		48		
19	REPLAY PERCENT		34	SERVICE CREDITS		49		
20	TOTAL SPECIALS		35	BALL SEARCH STARTED		50		
21	SPECIAL PERCENT		36	LOST BALL FEEDS		51		
22	TOTAL MATCHES		37	LOST BALL GAME STARTS		52	LEFT FLIPPER USED	
23	HIGH SCORE AWARDS		38	LEFT DRAINS		53	RIGHT FLIPPER USED	
24	HIGH SCORE PERCENT		39	CENTER DRAINS		54		
25	TOTAL FREE PLAYS		40	RIGHT DRAINS		55		
26	TOTAL PLAYS		41	SLAM TILTS				
27	0—19.9M SCORES		42	TOTAL BALLS SAVED				

South Park Audits 56-99 (All Audits Subject to Change)

	Audit Name	Fill-In		Audit Name	Fill-In		Audit Name	Fill-In
56	LEFT ORBIT		72	MBALL RESTARTED		88	VOLCANO STARTED	
57	TOP VUK VIA ORBIT		73	MBALL JACKPOTS		89	VOLCANO COMPLETED	
58	RAMP		74	SUPER JACKPOTS LIT		90	SUPER FART BUMPERS LIT	
59	RIGHT 3-BANK COMP		75	SUPER JACKPOTS		91	POP BUMPER HITS	
60	LEFT 5-BANK COMP		76	CARTMAN MODE STARTED		92	MYSTERY LIT	
61	CENTER 3-BANK HITS		77	CARTMAN MODE COMPLETED		93	MYSTERY SCORED	
62	KENNY OPTO		78	KYLE MODE STARTED		94	SKILL SHOT MADE	
63	KENNY UNDERTROUGH		79	KYLE MODE COMPLETED		95		
64	TOILET UNDERTROUGH		80	KENNY MODE STARTED		96		
65	CARTMAN UNDERTROUGH		81	KENNY MODE COMPLETED		97		
66	SUPER VUK		82	CHEF MODE STARTED		98		
67	TOP VUK		83	CHEF MODE COMPLETED		99		
68	MBALL READY		84	STAN MODE STARTED			*CPU Version:*	
69	MULTIBALL START		85	STAN MODE COMPLETED			*Display Version:*	
70	2+ MBALL START		86	SPOOKY VISION LIT			*Date Audited:*	
71	MULTIBALL RESTART LIT		87	SPOOKY VISION STARTED			*Audited By:*	

Location:



Go To Audits Menu

Overview

The **Portals™ Service Menu System** provides 99 Audit Functions for accounting purposes and for evaluation of *Game Difficulty Adjustments*. The Audit Functions are divided into 3 groups: 1st— **Earnings (Coin) Audits**, are the first 12 most-used Audits; 2nd— **Sega Audits**, are the Game Play Generic Audits 13-55; 3rd— **South Park Audits**, are the Game Play Specific Audits 56-99; Audits left open (blank space in gray, e.g. Audits 43-51, 54 & 55, 95-99) are currently ***Not Used,*** allowing for ***Future Expansion,*** if any, or are ***Proprietary***. If the code version is upgraded, view Audits in the display & write the audit(s) in the blank(s) if any audit(s) were added. Each group may be viewed in the **Portals™ Service Menu** (see Chapter 1, Portals Service Menu Introduction, of this Section). View all audits with the **Game Audit Table** provided on the previous page. Copy page to fill-in important audit information as required.

GO TO AUDITS MENU

With the game in the Attract Mode, open the Coin Door and press the **Black "BEGIN TEST" Button**. Select the "AUD" *Icon* in the **MAIN MENU** with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. The **AUDITS MENU** appears.

Important Notes:

Exit any sub-menu and return to the **MAIN MENU** by selecting & activating the "PREV" *Icons*. If no *Icons* appear in the display because of a testing function or special display (e.g. "Help"), press any button to exit.

Selecting & activating the "QUIT" *Icon* from any display will exit the Service Session.

Selecting & activating the "HELP" *Icon* from any display will show a help screen. (An explanation of each *Mini-Icon* at that level will cycle continuously until any active button is pressed.)

Selecting & activating the "ARROW" *Icons* selects the next or previous audit in the group.

Earnings Audits (1-12)

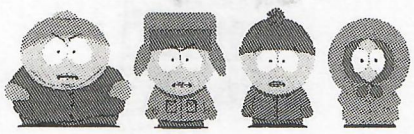
From the **AUDITS MENU**, select the "EARN" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. Select and activate the "RIGHT ARROW" *Icon* to view the 1st audit in this group. Continue to select either of the "ARROW" *Icons* to view each audit one at a time. The display will describe the audit number, the audit name, and the audit total or value. The current audit will remain in the display until the next audit is chosen or when the sub-menu is exited.

Au. Nº	Audit Name	Audit Definition
Au. 1	Total Paid Credits	Provides the total number of paid credits.
Au. 2	Free Game Percentage	This percentage is derived from dividing Audit 25, Total Free Plays, by Audit 26, Total Plays.
Au. 3	Average Ball Time	In seconds, the average ball time is derived from the total play time divided by Audit 13, Total Balls Played.
Au. 4	Average Game Time	The average game time is expressed in minutes and seconds.
Au. 5	Coins Thru Left Slot	Provides the total number of times Coin Switch (Sw. 6) was closed.
Au. 6	Coins Thru Right Slot	Provides the total number of times Coin Switch (Sw. 4) was closed.
Au. 7	Coins Thru Center Slot	Provides the total number of times Coin Switch (Sw. 5) was closed.
Au. 8	Coins Thru 4th Slot	Provides the total number of times Coin Switch (Sw. 2) was closed.
Au. 9	Total Coins	Provides the total amount of coins registered through all the slots.
Au. 10	Total Earnings	The total cash value accumulated since the last *Factory Restore* occurred (see Chapter 5, Go to Reset Menu, of this section).
Au. 11	Meter Clicks	Provides the total number of money clicks accumulated. (Based on the country's lowest coin denomination used for the game credit.)
Au. 12	Software Meter	Provides the continuing total of Meter Clicks. This audit cannot be reset; the display shows the constant addition of Meter Clicks.

Sega Audits (13-55)

From the **AUDITS MENU**, select the "SEGA" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. Select and activate the "RIGHT ARROW" *Icon* to view the 1st audit in this group. Continue to select either of the "ARROW" *Icons* to view each audit one at a time. The display will describe the audit number, the audit name, and the audit total or value. The current audit will remain in the display until the next audit is chosen or when the sub-menu is exited.

Au. №	Audit Name	Audit Definition
Au. 13	Total Balls Played	Provides the total number of regular and extra balls.
Au. 14	Total Extra Balls	Provides the total number of extra balls awarded.
Au. 15	Extra Balls Percent	Provides the percentage total from dividing Audit 14, Total Extra Balls, by Audit 26, Total Plays.
Au. 16	Replay 1 Awards	Provides the total awards (Credit, Extra Ball, Or Audit) for level 1.
Au. 17	Replay 2+ Awards	Provides the total awards (Credit, Extra Ball, Or Audit) for level(s) 2 or higher.
Au. 18	Total Replays	Provides the total awards (Credits, Extra Balls, Or Audit Only) for exceeding replay score levels.
Au. 19	Replay Percent	Provides the percentage total from dividing Audit 18, Total Replays, by Audit 26, Total Plays. The percentage reflects replay total awards for exceeding replay score levels.
Au. 20	Total Specials	Provides the total awards (Credits, Extra Balls, Or Scores) for making specials.
Au. 21	Special Percent	This percentage is derived from dividing Audit 20, Total Specials, by Audit 26, Total Plays.
Au. 22	Total Matches	Provides the total credits awarded for matching the last two digits of the score with the system-generated Match Number at the end of the game. Percentage of match credits is adjustable from 0% to 10% by Adjustment 11, Match Percentage, if enabled. (See Chapter 4, Go to Adjustments Menu, of this section.)
Au. 23	High Score Awards	Provides the total credits awarded for exceeding the High-Score-To-Date scores.
Au. 24	High Score Percent	This percentage is derived from dividing Audit 23, High Score Awards, by Audit 26, Total Plays.
Au. 25	Total Free Plays	Provides the total free credits for replays, High-Score-To-Date, Specials, and Match.
Au. 26	Total Plays	This total is derived by adding the sum of Audit 1, Total Paid Credits, and Audit 25, Total Free Plays. Note that free credits are not recorded in the Audit until they are actually used.
Au. 27	0—19.9M Scores	Provides the total number of games the Player's final score was between 0 and 19,900,000 points.
Au. 28	20M—49.9M Scores	Provides the total number of games the Player's final score was between 20,000,000 and 49,900,000 points.
Au. 29	50M—69.9M Scores	Provides the total number of games the Player's final score was between 50,000,000 and 69,900,000 points.
Au. 30	70M—99.9M Scores	Provides the total number of games the Player's final score was between 70,000,000 and 99,900,000 points.
Au. 31	100M—129.9M Scores	Provides the total number of games the Player's final score was between 100,000,000 and 129,900,000 points.
Au. 32	130M+ Scores	Provides the total number of games the Player's final score was over 130,000,000 points.
Au. 33	Average Scores	This total is derived from adding the Final Score of each game to a table and dividing this sum by Audit 26, Total Plays.
Au. 34	Service Credits	Provides the total number of times Dedicated Switch (DS-7) was closed, not in the Portals™ Service Menu. (See Chapter 1, Introduction [*Access & Use*] for instructions on how to receive Service Credits.)
Au. 35	Ball Search Started	Provides the total number of times the game performed a ball search.
Au. 36	Lost Ball Feeds	Provides the total number of times the game added a ball to play when it could not find a ball after ball search.



Sega Audits Continued.

Audit Name		Audit Definition
Au. 37	Lost Ball Game Starts	Provides the total number of times the game started with a ball missing from the ball trough at the start of a game.
Au. 38	Left Drains	Provides the total number of times Rollover Switch 57 was closed.
Au. 39	Center Drains	Provides the total number of times the game ball had drained with the last switch closed was not Sw. 57 or Sw. 60.
Au. 40	Right Drains	Provides the total number of times Rollover Switch 60 was closed.
Au. 41	Slam Tilts	Provides the total number of times Contact Switch 55 was closed.
Au. 42	Total Balls Saved	Provides the total number of times this feature was used. This feature is enabled at the start of each ball and is disabled as soon as the ball makes contact with 5 game switches or allocated time expired.
Au. 43-Au. 51		These audits are ***Not Used***, allowing for ***Future Expansion***, if any, and/or ***Proprietary*** (used for programming).
Au. 52	Left Flipper Used	Provides the total number of times Dedicated Switch (DS-1) was closed.
Au. 53	Right Flipper Used	Provides the total number of times Dedicated Switch (DS-3) was closed.
Au. 54-Au. 55		These audits are ***Not Used***, allowing for ***Future Expansion***, if any, and/or ***Proprietary*** (used for programming).

South Park Audits (56-99) (All Audits Subject to Change)

From the **AUDITS MENU**, select the "PARK" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. Select and activate the "RIGHT ARROW" *Icon* to view the 1st audit in this group. Continue to select either of the "ARROW" *Icons* to view each audit one at a time. The display will describe the audit number, the audit name, and the audit total or value. The current audit will remain in the display until the next audit is chosen or when the sub-menu is exited.

Au. №	Audit Name	Audit Definition
Au. 56	Left Orbit	Provides the total number of times this feature was completed. †
Au. 57	Top VUK Via Orbit	Provides the total number of times this feature was completed. †
Au. 58	Ramp	Provides the total number of times this feature was completed. †
Au. 59	Right 3-Bank Comp(leted)	Provides the total number of times this feature was completed. †
Au. 60	Left 5-Bank Comp(leted)	Provides the total number of times this feature was completed. †
Au. 61	Center 3-Bank Hits	Provides the total number of times this feature was completed. †
Au. 62	Kenny OPTO	Provides the total number of times OPTO Switch 42 was closed.
Au. 63	Kenny Undertrough	Provides the total number of times Rollover Switch 44 was closed.
Au. 64	Toilet Undertrough	Provides the total number of times Rollover Switch 43 was closed.
Au. 65	Cartman Undertrough	Provides the total number of times Rollover Switch 48 was closed.
Au. 66	Super VUK	Provides the total number of times SVUK Switch 45 was closed.
Au. 67	Top VUK	Provides the total number of times VUK Switch 46 was closed.
Au. 68	MBall Ready	Provides the total number of times this feature was ready (lit) awaiting Multiball. † ‡
Au. 69	Multiball Start	Provides the total number of times Multiball was played. †
Au. 70	2+ MBall Start	Provides the total number of times Multiball was played more than once by a single player in one game. †
Au. 71	Multiball Restart Lit	Provides the total number of times Multiball was played and no Jackpots were collected. ‡
Au. 72	Multiball Restarted	Provides the total number of times Multiball was restarted after Multiball Restart was lit. ‡
Au. 73	MBall Jackpots	Provides the total number of times this feature was awarded. †
Au. 74	Super Jackpot Lit	Provides the total number of times this feature was lit. ‡

† Multiple variations of switch closures (see Diagnostics) are used to determine completion of the feature stated.
‡ Multiple variations of switch closures (see Diagnostics) are used to determine the lighting of the feature stated.

	Audit Name	Audit Definition
Au. 75	Super Jackpots	Provides the total number of times this feature was awarded. †
Au. 76	Cartman Mode Started	Provides the total number of times this feature was started. †
Au. 77	Cartman Mode Completed	Provides the total number of times this feature was completed. †
Au. 78	Kyle Mode Started	Provides the total number of times this feature was started. †
Au. 79	Kyle Mode Completed	Provides the total number of times this feature was completed. †
Au. 80	Kenny Mode Started	Provides the total number of times this feature was started. †
Au. 81	Kenny Mode Completed	Provides the total number of times this feature was completed. †
Au. 82	Chef Mode Started	Provides the total number of times this feature was started. †
Au. 83	Chef Mode Completed	Provides the total number of times this feature was completed. †
Au. 84	Stan Mode Started	Provides the total number of times this feature was started. †
Au. 85	Stan Mode Completed	Provides the total number of times this feature was completed. †
Au. 86	Spooky Vision Lit	Provides the total number of times this feature was lit. ‡
Au. 87	Spooky Vision Started	Provides the total number of times this feature was started. †
Au. 88	Volcano Started	Provides the total number of times this feature was started. †
Au. 89	Volcano Completed	Provides the total number of times this feature was completed. †
Au. 90	Super Fart Bumpers Lit	Provides the total number of times this feature was lit. ‡
Au. 91	Pop Bumper Hits	Provides the total number of times this feature was completed. †
Au. 92	Mystery Lit	Provides the total number of times this feature was lit. ‡
Au. 93	Mystery Scored	Provides the total number of times this feature was awarded. †
Au. 94	Skill Shot Made	Provides the total number of times this feature was completed. †
Au. 95-Au. 99		At time of printing, these audits are ***Not Used***, allowing for ***Future Expansion***, if any.

† Multiple variations of switch closures (see Diagnostics) are used to determine completion of the feature stated.
‡ Multiple variations of switch closures (see Diagnostics) are used to determine the lighting of the feature stated.

Use the below space for any additions and/or changes, if any (see the Dot Matrix Display):

Au.

Au.

Au.

Au.

Au.

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Au.

Go To Printer Menu

From the **AUDITS MENU**, select the "PRNT" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. The **PRINTER MENU** appears.

☞ Special equipment is required for this Sub-Menu

The **Portals™ Service Menu System** provides 3 Audit Printing Adjustment Functions to print information on a "Hand-Held" printer, download game information to a Laptop PC or clear the printout count. A printer interface board, hand-held printer and/or a special software program is required to run this menu. Entering this menu and selection/activation of the *Icons* without this equipment/software will not affect the game.

Adjustment 57, Printer Interface (Quick Printout)

From the **PRINTER MENU**, select the "QUIK" *Icon* with either **Red** or **Green Button** and press the **Black Button**. Select the "+" *Icon* and press the **Black Button** to start the printout. Only the Earnings Audits can be printed out to a "Hand-Held" Printer.

Adjustment 58, Alison Interface (Full Printout)

From the **PRINTER MENU**, select the "ALISON" *Icon* with either **Red** or **Green Button** and press the **Black Button**. Select the "+" *Icon* and press the **Black Button** to start the download. A special software program and a Lap Top PC is required. All game audits (Earnings, Sega & Game Specific) can be retrieved.

Adjustment 59, Nº of Copies Printed (Reset Printer)

From the **PRINTER MENU**, select the "RESET" *Icon* with either **Red** or **Green Button** and press the **Black Button**. Select the "+" *Icon* and press the **Black Button** to start the clear the "Nº of copies printed" count total.

RESETTING AUDIT NOTES:

Audit Note: 1st Way to Reset Audits

To reset audits, from the **MAIN MENU**, select the "ADJ" *Icon*. See Chapter 4, Go to Adjustments Menu, of this section.

Select the "SEGA" *Icon*, from the **ADJUSTMENT MENU**, and advance to Adj. 8, Reset Coin Audits, with the "RIGHT ARROW" *Icon*. Select the "+" *Icon* to change setting to **YES**. When enabled, the *Coin Audits* (5-11) will be reset to zero.

Advance to Adj. 9, Reset Game Audits, with the "RIGHT ARROW" *Icon*. Select the "+" *Icon* to change setting to **YES**. When enabled, *all the audits* will be reset to zero, **except** for the *Coin Audits* (5-11) ***and*** Audit 12, Software Meter (the only audit which cannot be reset to zero).

Audit Note: 2nd Way to Reset Audits

To reset audits, from the **MAIN MENU**, select the "RESET" *Icon*. See Chapter 5, Go to Reset Menu, of this section.

Selection of the "COIN" *Icon*, from the **RESET MENU**, will reset the *Coin Audits* (5-11) to zero.

Selection of the "AUD" *Icon*, from the **RESET MENU**, will reset all audits to zero, **except** for the *Coin Audits* (5-11) ***and*** Audit 12, Software Meter (the only audit which cannot be reset to zero).

SOUTH PARK
GAME ADJUSTMENT TABLE

Some adjustments have a "Drop-Down" Table for further customization.

SEGA PINBALL, INC.

Sega Adjustments 1-48

	Adjustment Name	USA Default	Your Setting		Adjustment Name	USA Default	Your Setting
1	REPLAYS: FIXED/MANUAL ‡	...10%...		25	DEFAULT HIGH SCORE #5	300,000,000	
2	REPLAY LEVELS ‡	1 ...		26	DEFAULT HIGH SCORE #6	275,000,000	
3	REPLAY AWARD	CREDIT		27	DEFAULT HIGH SCORE #7	250,000,000	
4	FREE GAME LIMIT	05		28	DEFAULT HIGH SCORE #8	225,000,000	
5	EXTRA BALL LIMIT	03		29	DEFAULT HIGH SCORE #9	200,000,000	
6	GAME DIFFICULTY ‡	MODERATE		30	DEFAULT HIGH SCORE #10	175,000,000	
7	GAME PRICING ‡	USA3		31	HSTD RESET COUNT	2,000	
8	RESET COIN AUDITS	NO		32	HIGH SCORE INITIALS	3 Initials	
9	RESET GAME AUDITS	NO		33	FREE PLAY	NO	
10	RESET HIGH SCORES	NO		34	CUSTOM MESSAGE	ON	
11	MATCH PERCENTAGE	9%		35	ATTRACT MODE MUSIC	ON	
12	BALLS PER GAME	03		36	FLASH LAMP POWER	NORMAL	
13	TILT WARNINGS	01		37	COIL PULSE POWER	NORMAL	
14	REPLAY BOOST	YES		38	KNOCKER VOLUME	NORMAL	
15	CREDIT LIMIT	30		39	MINIMUM GAME TIME	OFF	
16	ALLOW HIGH SCORES	YES		40	BKGRND MUSIC VOLUME	01	
17	HIGH SCORE #1 AWARDS	01		41	GAME RESTART	YES	
18	HIGH SCORE #2 AWARDS	00		42	EXTRA BALL PERCENTAGE	25%	
19	HIGH SCORE #3 AWARDS	00		43	BILL VALIDATOR	NO	
20	HIGH SCORE #4 AWARDS	00		44	TOURNAMENT MODE	NONE	
21	DEFAULT HIGH SCORE #1	400,000,000		45	EURO. TOKEN DISP.	OFF	
22	DEFAULT HIGH SCORE #2	375,000,000		46	SPECIAL MEMORY	YES	
23	DEFAULT HIGH SCORE #3	350,000,000		47	LOCATION ID	00	
24	DEFAULT HIGH SCORE #4	325,000,000		48	GAME ID	00	

PLEASE NOTE: All Factory Settings (Defaults) described in the tables above/below and within the Adjustment Definitions are for USA Settings only (CPU/Snd Bd. Dip Sw. 300 Settings 1-8 are all "OFF"). Different countries may have different Factory Settings (Defaults). ‡ Adj. 1, 2, 6 & 7 have "Drop-Down" Tables, see definitions.

South Park Adjustments 49-56

	Adjustment Name	USA Default	Your Setting		Adjustment Name	USA Default	Your Setting
49	EXTRA BALL MEMORY	ON		54	UK POST SAVE ENABLED	NO	
50	MBALL RESTART	MODERATE		55	UK COIN MECH. TYPE	CURRENT:	
51	MULTIBALL CRITERION	MODERATE		ADJ. 54 CAN ONLY BE ADJUSTED IF THE GAME HAS THE UK EPROM INSTALLED (UK ONLY). ADJ. 55 CAN ONLY BE ADJUSTED IF USING UK DIP SWITCH OPTION SETTING 2.			
52	TOILET MECH ENABLED	YES		56	ADULT SPEECH ENABLED	YES	
53	KENNY MECH ENABLED	YES		**57-59** *are Special Audit Adjustments (see previous pg.)*			

Go To Adjustments Menu

Overview

The **Portals™ Service Menu System** provides 56 Adjustment Functions to vary game difficulty or to customize (e.g. Adjusting: High Score Levels; Balls per game; Game Pricing; Default High Scores; etc.). The Adjustment Functions are divided into 2 groups: 1st— **Sega Adjustments**, are the Game Play Generic Adjustments (1-48); 2nd— **South Park Adjustments**, are the Game Play Specific Adjustments (49-56); Any Adjustment(s) left open or are currently *Not Used*, are allowing for Future Expansion, if any, or are Proprietary. If the code version is upgraded, view Adjustments in the display & write the adjustment(s) in the blank(s) if any adjustment(s) were added. Each group may be viewed manually after entering the **Portals™ Service Menu** (see Chapter 1, Portals™ Service Menu Introduction, of this Section). All adjustments can be viewed at a glance with the **Game Adjustment Table** provided on the previous page. If a value is changed, the display will indicate **REQUEST INSTALLED**.

GO TO ADJUSTMENTS MENU

With the game in the Attract Mode, open the Coin Door and press the **Black "BEGIN TEST" Button**. Select the "ADJ" *Icon* in the **MAIN MENU** with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. The **ADJUSTMENTS MENU** appears.

Important Notes:

Exit any sub-menu and return to the **MAIN MENU** by selecting & activating the "PREV" *Icons*. If no *Icons* appear in the display because of a testing function or special display (e.g. "Help"), press any button to exit.

Selecting & activating the "QUIT" *Icon* from any display will exit the Service Session.

Selecting & activating the "HELP" *Icon* from any display will show a help screen. (An explanation of each *Mini-Icon* at that level will cycle continuously until any active button is pressed.)

In Adjustments, selecting & activating the "-" *Icon* decrements the value setting. Selecting & activating the "+" *Icon* increments the value setting.

Selecting & activating the "ARROW" *Icons* selects the next or previous adj. in the group.

Sega Adjustments (1-48)

From the **ADJUSTMENTS MENU**, select the "SEGA" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. Select and activate the "RIGHT ARROW" *Icon* to view the 1st adjustment in this group. Continue to select either of the "ARROW" *Icons* to view each adjustment one at a time. Select either the "-" or "+" *Icons* to change the value, if desired. The display will describe the adjustment number, the adjustment name, and the adjustment total or value. The current adjustment will remain in the display until the next adjustment is chosen or when the sub-menu is exited.

Adj. Nº	Adjustment Name	Adjustment Definition
Adj. 1	**Replays: Fixed / Manual**	Adjust for percentage of awards for Replay Levels (1% through 50%). Lower the automatic value to 0% and the display will indicated Fixed. Replays may be adjusted either for fixed levels or for a system-adjusted manual percentage of replay awards. Four levels may be selected. Adjustments allow awarding of a credit or an extra ball as each level is exceeded. With the manual percentage feature, if the actual replay percentage is higher or lower than that desired, the game computes new recommended manual percentage score(s). When the coin door is subsequently opened the player displays indicate the recommended level and a sound is made to alert the operator of a potential change. This new level is entered into adjustments simply by pressing the **Black "ENTER" Button**. (If the Coin Door is closed or the operator enters the Portals™ Service Menu, the replay level is not changed.)
Adj. 2	**Replay Levels**	Adjust the number of replay levels to be active (1 to 4). Once the number of Replay Levels has been selected, a "Drop-Down" Table appears showing Replay Level 1. Adjust Replay Level 1 between 10M - 9.99B. Adjust Replay Level 2, 3 and/or 4 respectively.
Adj. 3	**Replay Award**	Set for replays to award: **CREDIT, EXTRA BALL, NONE** or **SPECIAL** (When score threshold is achieved, a Playfield Special is lit.)

Adjustment Name		Adjustment Definition
Adj. 4	**Free Game Limit**	Adjust the max. # of *Free Games* that may be accumulated per game; **0 - 9**.
Adj. 5	**Extra Ball Limit**	Adjust the max. # of *Extra Balls* that may be accumulated per game; **1 - 9** or **OFF**.
Adj. 6	**Game Difficulty**	Set to **EXTRA EASY**, **EASY**, **MODERATE, HARD** or **EXTRA HARD.** *(Note: Additional game features which are not adjusted may also change when adjusting this adjustment; see below table.)* Default is **MODERATE**. Any one of the ***INSTALL*** settings (in a "Drop-Down" Table) for this adjustment may be activated to automatically select settings for multiple adjustments affecting game difficulty. Select and activate the "-" or "+" *Icons* to choose the difficulty level required. After activation, the individual adjustments may be readjusted, if desired. Refer to the **Install Adjustment Table** below for details.

Adjustments which change when set to:	Extra Easy	Easy	Moderate	Hard	Extra Hard
(49) Extra Ball Memory	ON	ON	ON	ON	OFF
(50) MBall Restart	EXTRA EASY	EASY	MODERATE	HARD	EXTRA HARD
(51) Multiball Criterion	EXTRA EASY	EASY	MODERATE	HARD	EXTRA HARD

Play Rules: Novelty & 5-Ball, plus Add-A-Ball Settings

The following three combinations are recommended for situations where local laws restrict certain game features regarding the use of replays or the number of balls per game:

Novelty Play Rules - Set to establish recommended settings for no Free Play or Extra Balls:

Adj.	*Adjustment* Name	*Setting*	*Adj.*	*Adjustment Name*	*Setting*
1	Replays: Fixed/Manual	Fixed	5	Extra Ball Limit	00
2	Replay Levels	None	11	Match Percentage	Off
3	Replay Award	None	17	High Score #1 Awards	1
4	Free Game Limit	0	18	High Score #2 Awards	0

5-Ball Play Rules - Set to establish recommended settings for 5-Ball Play:

Adj.	Adjustment Name	*Setting*	*Adj.*	Adjustment Name	*Setting*
1	Replays: Fixed/Manual	07%	5	Extra Ball Limit	3
2	Replay Levels	1	11	Match Percentage	4
3	Replay Award	Credit	12	Balls Per Game	5
4	Free Game Limit	5	17	High Score #1 Awards	1
			18	High Score #2 Awards	0

Add-A-Ball Settings -To disable awarding of credits and provide awards with an Extra Ball:

Adj.	*Adjustment Name*	*Setting*	*Adj.*	*Adjustment Name*	*Setting*
3	Replay Award	Extra Ball	16	Allow High Scores	No
4	Free Game Limit	00	17-20	High Score #1 - #4 Awards	0
11	Match Percentage	Off			

Adj. 7	**Game Pricing**	There are two methods available for coin switch programming: Standard & Custom. Standard pricing uses a single adjustment as seen in the first display. See the Standard Pricing Table. If "Custom" is selected, a "Drop-Down" Table appears. Select a pricing scheme shown in the **Custom Pricing Table** as seen below.

With Adjustment 7 set to **CUSTOM** operating the **Black "Enter" Button** again initiates a drop down menu representing coin switch pulses for the LEFT, CENTER, RIGHT and 4TH Coin Slots. The prescribed the number of pulses are required for 1 Credit. For example, if *Left Coin Pulses,* was set to 02 and *Coin Switch Pulses Required for 1 Credit*, to 01 a coin in the Left Slot would produce 2 Credits. Further, if *Left Coin Pulses,* was set to 01 and *Coin Switch Pulses Required for 1 Credit*, to 02, 2 Coins in the Left Slot would be required for 1 Credit.

Coin Switch Pulses Required for Bonus Credit may be set to post bonus credits when a minimum amount of coins are inserted at one time. For example, if *Left Coin Pulses* was set to 01, *Coin Switch Pulses Required for 1 Credit* to 01 and *Coin Switch Pulses Required for Bonus Credit* to 04, 1 Credit would be posted for each of the first 3 Coins in the Left Slot and 2 Credits for the 4th Coin.

Sega Adjustment 7 Continued.

Standard/Custom Pricing - Set for the desired pricing scheme from the Standard Pricing Table as indicated on the Dot Matrix Display. For Custom Pricing, set to **CUSTOM**. When set to **CUSTOM**, the following adjustments are utilized to tailor each individual coin chute:

Left Coin Switch Pulses	Set the number of pulses registered for closure of the Left Coin Switch; **00** to **99**.
Right Coin Switch Pulses	Set the number of pulses registered for closure of the Right Coin Switch; **00** to **99**.
Center Coin Switch Pulses	Set the number of pulses registered for closure of the Center Coin Switch; **00** to **99**.
4th Coin Switch Pulses	Set the number of pulses registered for closure of the Fourth Coin Switch; **00** to **99**.
Coin Switch Pulses Required for 1 Credit	Set the number of pulses required to post one credit; **00** to **99**.
Coin Switch Pulses Required for Bonus Credit	Set the number of pulses required to award the 1st Bonus credit(s); **00** to **99**.
Coin Switch Pulses Required for 2nd Bonus Credit	Set the number of pulses required to award the 2nd Bonus credit; **00** to **99**.
Credits awarded for 1st Bonus	Set the number of credits awarded for achieving the first Bonus level; **00** to **99**.

Custom Pricing Table

Coin Mechanisms					<<< Adjustments >>>							
LEFT	CENTER	RIGHT	4TH	*Plays/Coins*	LEFT Pulses	CENTER Pulses	RIGHT Pulses	4TH Pulses	Pulses /Credit	Pulses /Bonus	Pulses 2nd Bonus	Credit 1st Bonus
25¢	$1.00	25¢	N/U	1/25¢ 3/50¢ 1/25¢ 5/$1.00 1/25¢ 6/$1.00	01 01 05	04 04 20	01 01 05	00 00 00	01 01 04	02 04 20	00 00 00	01 01 01
5SCH	10SCH	10SCH	N/U	1/10 S 1/10 S 4/30 S	01 04	02 08	02 08	00 00	02 06	00 00	00 00	00 00
10p	50p	£1	20p	1/30p 2/50p 5/£1 1/50p 3/£1 1/30p 4/£1	01 01 01	06 05 05	15 15 12	02 02 02	03 05 03	00 00 00	00 00 00	00 00 00
20¢	N/U	$1.00	N/U	1/60¢ 2/$1.00	01	00	05	00	03	05	00	01

Below and the following page is the **Standard Pricing Select Table** for the individual countries listed. The *Pricing Scheme* is determined in two ways - **1:** The CPU/Sound Board Dip Switch (Sw. 300) Setting; and, **2:** The Country Setting Option. For each country listed, the Dip Switch Setting is shown (Column 1). At this time, not all countries have a *unique* Dip Switch Setting. For the countries without a unique setting, the USA Setting (or all positions in the "OFF" position) is used. In lieu of determining the best *Pricing Scheme* for your location, "pre-sets" were made available which would best suit any given situation. If the Factory Default setting is not the selection you feel is best for your location, choose any of the other pre-set settings. If any of these settings do not suit your needs, then **CUSTOM PRICING** will need to be accomplished (however, any "custom" changes made here will be lost after a **FACTORY RESET** so it is suggested to write down your unique set-up).

The Standard Pricing Select Table Explained:

Column 1: CPU/Sound Board Dip Switch 300 Settings: (self-explanatory). **Column 2:** Country Setting Option: The different available pre-sets are listed. **Columns 3-6:** Coin Mechanisms - These show the coinage through the available slots on the Coin Doors. Different countries use different Coin Doors. For example, USA style Coin Doors, which have only 2 coin acceptors (left & right) may utilize the "Center" slot cable for an optional Bill Validator. Different Coin Doors may have up to 4 coin acceptors. **Columns 7-10:** Pricing Scheme Explained - Shows the number of plays received for the monies required determined by the setting selected.

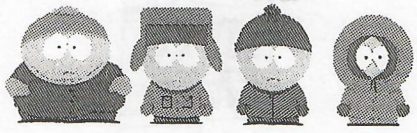
Standard Pricing Select Table

CPU/SOUND BOARD DIP SWITCH 300 SETTINGS	COUNTRY SETTING OPTION	Coin Mechanisms — COINS THRU ... SLOT: LEFT	CENTER	RIGHT	4TH	Pricing Scheme Explained — *Number of "Plays" for Price Amount Shown*			
Pos. 1 2 3 4 5 6 7 8 ON OFF ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼	USA1	25¢	$1.00	25¢		1 /25¢			
	USA2	25¢	$1.00	25¢		1 /50¢	2 /75¢	3 /$1.00	
	USA3 (Default)	25¢	$1.00	25¢		1 /50¢			
	USA4	25¢		25¢		1 /50¢			
	USA5	25¢	$1.00	25¢		1 /50¢	5 /$2.00		
	USA6	25¢	$1.00	25¢		1 /50¢	2 /'4 X 25¢'	3 /$1.00 Bill ← Used to promote the Bill Validator	
	USA7	25¢	$1.00	25¢		1 /50¢	4 /$1.50	6 /$2.00	
	USA8	25¢	$1.00	25¢		1 /50¢	3 /$1.00		

Standard Pricing Select Table - *(Continued)*

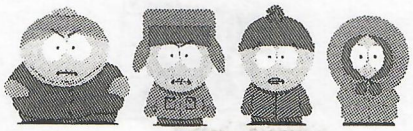
CPU DIP SWITCH SETTINGS, Location SW300 CPU/SOUND BOARD	COUNTRY SETTING OPTION † ‡	Coin Mechanisms — COINS THRU ... SLOT: LEFT	CENTER	RIGHT	4TH	Pricing Scheme Explained — *Number of "Plays" for Price Amount Shown*			
		Please Note: for all USA Settings, see previous page (bottom).							
Pos. 1 2 3 4 5 6 7 8 / ON ▲ / OFF ▼▼▼▼▼▼▼▼	Austria †	5S	10S	10S		1 /10S	2 /15S	3 /20S	
Pos. 1 2 3 4 5 6 7 8 / ON / OFF ▼▼▼▼▼▼▼▼	Australia 1 ‡	20¢	$A 1	$A 2		1 /$A 1	2 /$A 2		
	Australia 2 ‡	20¢	$A 1	$A 2		1 /$A 1	2 /$A 2		
Pos. 1 2 3 4 5 6 7 8 / ON ▲ / OFF ▼ ▼▼▼▼▼▼	Belgium †	5 BF	20 BF	50 BF		1 /20 BF	3 /50 BF		
Pos. 1 2 3 4 5 6 7 8 / ON ▲ ▲ / OFF ▼ ▼ ▼▼▼▼	Brazil †	This country uses unique Tokens and/or Debit Cards *only* (pricing varies).							
		1 'coin'	4 'coins'	1 'coin'		1 /'2 coins'			
Pos. 1 2 3 4 5 6 7 8 / ON ▲▲ / OFF ▼▼▼▼▼▼	Canada †	25¢	25¢	Can$ 1		1 /50¢	2 /75¢	3/ Can$ 1	
Pos. 1 2 3 4 5 6 7 8 / ON / OFF ▼▼▼▼▼▼▼▼	Denmark 1 ‡	1 DKr	5 DKr	10 DKr	20 DKr	1 /3 DKr	2 /5 DKr		
	Denmark 2 ‡	1 DKr	5 DKr	10 DKr	20 DKr	1 /2 DKr	3 /5 DKr	7 /10DKr	
Pos. 1 2 3 4 5 6 7 8 / ON / OFF ▼▼▼▼▼▼▼▼	Finland ‡	1 Fmk	5 Fmk			1 /5 Fmk	4 /10 Fmk		
Pos. 1 2 3 4 5 6 7 8 / ON ▲ ▲ / OFF ▼ ▼▼▼▼▼	France 1 †	1 Fr	5Fr	10 Fr	20 Fr	1 /3 Fr	2 /5 Fr	5 /10 Fr	11 /20 Fr
	France 2	1 Fr	5 Fr	10 Fr	20 Fr	1 /5 Fr	3 /10 Fr	7 /20 Fr	
	France 3	1 Fr	5 Fr	10 Fr	20 Fr	1 /3 Fr	2 /5 Fr	4 /10 Fr	9 /20 Fr
	Germany 1	1 DM	2 DM	5 DM		1 /1 DM	6/'1 X 5 DM'		
Pos. 1 2 3 4 5 6 7 8 / ON ▲▲▲ / OFF ▼▼▼▼▼	Germany 2	1 DM	2 DM	5 DM		1 /2 DM	2 /3 DM	3 /4 DM	4 /5 DM
	Germany 3 †	1 DM	2 DM	5 DM		1 /2 DM	2 /3 DM	3 /4 DM	5 /5 DM
	Germany 4	1 DM	2 DM	5 DM		1 /1 DM	6 /5 DM		
Pos. 1 2 3 4 5 6 7 8 / ON / OFF ▼▼▼▼▼▼▼▼	Greece ‡	50 Dr		100 Dr		1 /50 Dr	3 /100 Dr		
Pos. 1 2 3 4 5 6 7 8 / ON / OFF ▼▼▼▼▼▼▼▼	Hong Kong ‡	1 HK$	2 HK$	5 HK$		1 /5 HK$			
Pos. 1 2 3 4 5 6 7 8 / ON / OFF ▼▼▼▼▼▼▼▼	Hungary ‡	10 Ft	10 Ft	20 Ft		1 /20 Ft	3 /40 Ft		
Pos. 1 2 3 4 5 6 7 8 / ON / OFF ▼▼▼ ▼▼▼▼▼	Italy 1 †	500 Lit		500 Lit		1 /500 Lit			
	Italy 2	500 Lit		500 Lit		1 /1000 Lit	3 /2000 Lit		
Pos. 1 2 3 4 5 6 7 8 / ON ▲ ▲ / OFF ▼▼ ▼▼▼▼▼	Japan 1 †			100¥		1 /100¥			
	Japan 2			100¥		1 /100¥	3 /200¥		
Pos. 1 2 3 4 5 6 7 8 / ON / OFF ▼▼▼▼▼▼▼▼	Korea ‡	100 Won		100 Won		1 /100 Won			
Pos. 1 2 3 4 5 6 7 8 / ON ▲ / OFF ▼▼ ▼▼▼▼▼	Netherlands 1	1 Fls.	1 Fls.	2.5 Fls.		1 /1 Fls.	3 /2.5 Fls.		
	Netherlands 2 †	1 Fls.	2.5 Fls.	5 Fls.		1 /1 Fls.	3 /2.5 Fls.	6 /5 Fls.	
Pos. 1 2 3 4 5 6 7 8 / ON / OFF ▼▼▼▼▼▼▼▼	New Zealand 1 ‡	$NZ 1		$NZ 2		1 /$NZ 1	2 /$NZ 2		
	New Zealand 2 ‡	$NZ 1		$NZ 2		1 /$NZ 1	3 /$NZ 2		
Pos. 1 2 3 4 5 6 7 8 / ON ▲ ▲ / OFF ▼ ▼ ▼▼▼▼▼	Norway 1 †	10 NKr	5 NKr	20 NKr		2 /10 NKr	1 /5 NKr	4 /20 NKr	
	Norway 2	10 NKr	5 NKr	20 NKr		1 /10 NKr	3 /20 NKr		
Pos. 1 2 3 4 5 6 7 8 / ON / OFF ▼▼▼▼▼▼▼▼	Spain ‡	100 Pts		500 Pts		1 /100 Pts	6 /500 Pts		
Pos. 1 2 3 4 5 6 7 8 / ON ▲▲ ▲ / OFF ▼ ▼▼▼▼▼	Sweden 1 †	1 SKr	5 SKr	10 SKr		1 /10 SKr	2 /15 SKr	3 /20 SKr	
	Sweden 2	1 SKr	5 SKr	10 SKr		1 /5 SKr			
Pos. 1 2 3 4 5 6 7 8 / ON ▲ ▲ / OFF ▼▼ ▼▼▼▼▼	Switzerland 1 †	1 SwF	2 SwF	5 SwF		1 /1 SwF	6 /5 SwF		
	Switzerland 2	1 SwF	2 SwF	5 SwF		1 /1 SwF	3 /2 SwF	9 /5 SwF	
Pos. 1 2 3 4 5 6 7 8 / ON ▲ ▲ / OFF ▼ ▼▼▼▼▼▼	UK 1 †	10p	50p	£1	20p	3 /£1	7 /£2	*The Pricing Scheme using the New* UK Dip Sw. Setting (with 2, 3 & 4 = ON), is the same (UK1 - UK6). Use only with the *New Style Coin Mech. The New 50p & £2* Coins can be accomodated in 5th & 6th Coin Slots.	
	UK 2	10p	50p	£1	20p	4 /£1	8 /£2		
Dip Switch Setting for New 50p / £2:	UK 3	10p	50p	£1	20p	1 /50p	2 /£1	5 /£2	
Pos. 1 2 3 4 5 6 7 8 / ON ▲ ▲ ▲ / OFF ▼ ▼▼▼▼▼	UK 4	10p	50p	£1	20p	1 /30p	2 /60p	3 /90p	4 /£1
	UK 5	10p	50p	£1	20p	1 /£1	3 /£2	This is "software controlled" by noting the presence/non-presense of pulses via Normal Coin Slots 1-4 (Left, Center, Right & 4th). If an old style Coin Mech is used, see new adjustment to accomodate.	
SEE NOTES IN PRICING SCHEME	UK 6	10p	50p	£1	20p	3 /£2			

Notes: † Indicates Factory Default for that setting. ‡ Indicates a USA Dip Switch Setting (all positions in the "OFF" position).



Adjustment Name		Adjustment Definition
Adj. 8	Reset Coin Audits	Default is **NO**. Select the "+" *Icon* to change to **YES**. ⚠ When enabled, all *Coin Audits* (Audits 5-11), will be reset to zero.
Adj. 9	Reset Game Audits	Default is **NO**. Select the "+" *Icon* to change to **YES**. ⚠ When enabled, all audits will be reset to zero, except for the *Coin Audits* (Audits 5-11) and Audit 12, Software Meter (the only audit which cannot be reset to zero).
Adj. 10	Reset High Scores	When enabled (set to **YES**) the High Score Levels and associated initials will be restored to the backup settings when the "+" *Icon* is selected and activated.
Adj. 11	Match Percentage	Set Match percent from **00%** to **10%** or **OFF**. At **00%** the match display occurs at the end of the game but never awards a credit.
Adj. 12	Balls Per Game	Default is **3**. Adjust the number of balls per game: **2** to **5**.
Adj. 13	Tilt Warnings	Adjust the number of plumb bob tilt switch closures before the ball in play is tilted; **1**, **2**, **3** or **OFF**.
Adj. 14	Replay Boost	Set to **YES** or **NO**. When set to **YES**, exceeding a replay will set a temporary replay level for each time a replay level is surpassed. This new level will equal the previous replay level (when the replay was awarded) plus 50 Million for each following game, until the replays have all been played. At this time the previous level is resumed.
Adj. 15	Credit Limit	Default is **30**. Adjust the maximum number of credits that may be posted: **4** to **50**.
Adj. 16	Allow High Scores	Set to **YES** or **NO**. When set to **YES** if a player exceeds any 1 of the 4 High Scores, the player may receive an award (depending on Adj. 3, Replay Award). Set to **NO** to disable this feature. There are 10 High Scores that will allow the player to enter their initials (or name) (See Adj. 32, Initials), however, only the top 4 can receive an award if this adjustment is enabled.
Adj. 17	High Score #1 Awards	Adjust the number of awards (**0** to **4**) awarded for exceeding level 1 (the highest of the four levels).
Adj. 18	High Score #2 Awards	Adjust the number of awards (**0** to **3**) awarded for exceeding level 2.
Adj. 19	High Score #3 Awards	Adjust the number of awards (**0** to **2**) awarded for exceeding level 3.
Adj. 20	High Score #4 Awards	Adjust the number of awards (**0** to **1**) awarded for exceeding level 4.
Adj. 21-30	Default High Score #1 - #10	Adjust the score level to which the world record, (level 1) (the highest of the four levels) may be altered. This adjustment is not affected by Adj. 31, HSTD Reset Count. Adjust the backup score to which levels **2 - 10** may be reset, respectively.
Adj. 31	HSTD Reset Count	Default is **2,000**. HSTD (**H**igh **S**core **T**o **D**ate). Adjust the number of games between automatic resets of high score levels to backup settings and ball time averager adjustments: **100** to **9,900** or **OFF** (no reset or adjustment).
Adj. 32	High Score Initials	Default is **3 INITIALS**. When set to **3 INITIALS**, player is allowed only 3 initials to input. When set to **10 LETTER NAME**, player is allowed to enter 10 initials to input.
Adj. 33	Free Play	When set to **YES**, no coins are required for game play.
Adj. 34	Custom Message	Set to **ON** or **OFF**. When set to **ON**, this function is used to establish a custom message periodically displayed during the attract mode. Set the feature to **CHANGE** selecting the "+" *Icon*. Using either of the Flipper Buttons or the **"RED"** and/or **"GREEN" Buttons**, select either of the **"ARROW"** *Icons*. Press the **"BLACK" Button** (*Request Installed* blinks at the top of the display and the letter **A** is indicated in the first position in the display. Vary the letter(s) by operating the Left and Right Flipper Buttons (or **"RED"** or **"GREEN" Buttons**). With the desired letter indicated, depress the **Start Button** to lock in the letter and advance to the next character. Repeat this procedure until the desired message is completed in the display. Select the "<" or ">" characters to back-space (erase) and/or to move forward in an already typed message. After completion, press the **"BLACK" Button**.

	Adjustment Name	Adjustment Definition
Adj. 35	Attract Mode Music	Set to **ON** or **OFF**. When set to **ON**, attraction music / sounds are played between games.
Adj. 36	Flash Lamp Power	Set to **NORMAL**, **DIM** or **OFF**. When set to **NORMAL** the flash lamps are active, when **DIM** the flash lamps impulse power is reduced by **25%** and when **OFF** the flash lamps will not flash.
Adj. 37	Coil Pulse Power	Set to **NORMAL, HARD** or **SOFT**. When **HARD** the coil pulse power is ***increased*** by **12.5%** of the normal pulse rate. When set to **SOFT** the coil pulse power is ***decreased*** by **12.5%** of the normal pulse rate. These adjustments are provided to compensate for Low Line or High Line voltage conditions where the solenoids appear to kicking too weak or too hard. Adjust as required.
Adj. 38	Knocker Volume	Set to **NORMAL, LOW** or **OFF**. Default is **NORMAL**. When set to **LOW**, the volume is decreased 50%. When set to **OFF**, no sound is heard when the "knocker" is sounded.
Adj. 39	Minimum Game Time	Set between **0:01 - 8:59** for minimum game time. Default is **OFF**. If the last ball in play drains prior to what the game time is set for, another ball will be served into the shooter lane and normal play will continue. Subsequent balls will continue to do be served into the shooter lane if the last ball still drains prior to and up until minimum game time is satisfied.
Adj. 40	Bkgrnd (Background) Music Volume	Set between **01 - 15**. Default is **01**. After volume is set via Portals Service Buttons (See Sec. 3, Chp. 1, ...Intro) this adjustment can be utilized to adjust the background music (1 all the way on, 15 all the way off) while keeping the Special Sound FX the same level.
Adj. 41	Game Restart	Set to **YES** or **NO**. When set to **YES**, a new game may be started during any ball after the first ball is completed (if credits are available). (Note-Pressing start during the first ball will add additional players.) When set to **NO**, the game disables the **Start Button** after the first ball until the final ball is in play. Review Section 2, Chapter 1, Game Operations & Features for details.
Adj. 42	Extra Ball Percentage	Set from **0** to **50**. Allows the operator to adjust how frequently the Extra Ball feature is made available to the player.
Adj. 43	Bill Validator	Set to **YES** or **NO**. When set to **YES** , the display, in game attract mode, will show an "*Insert Bill Animation.*" When set to **NO,** the display, in game attract mode will show "*Insert Coin Animation.*"
Adj. 44	Tournament Mode	Set to **NONE, PINBALL EXPO, IFPA-PAPA** or **HOME**. Tournament Mode determines the default conditions to quickly prepare a game for tournament play. When this setting is changed ***all audits will be reset*** and ***all adjustments will be initiated*** to the particular style selected. The game will then return to *Game Over Attract Mode*, as if a *Factory Reset* had been performed. **NONE** - Same as a Factory Reset conditions. **IFPA -** Straight 50¢ play, No Replay, No Extra Ball, No High Scores, 2 Tilt Warnings and No Match. **PINBALL EXPO- PAPA -** Same as **IFPA** settings except *Free Play is enabled.* **HOME -** Sets game for Free Play, Extra Ball Play, No Replay, **10%** Match & **30%** Extra Ball.
Adj. 45	Euro. Token Disp.	Set to **ON** or **OFF**. When set to **ON**, the operator can enable the BRN/BRN-GRY Wires (out of the Main Cabinet Cable Harness, by bottom speaker) to drive an external device (e.g. European Token Dispenser) without the game giving a replay. (Ref. Coil #8 or Q8)
Adj. 46	Special Memory	Set to **YES** or **NO**. When set to **YES**, the lit 'Special' light will be retained in memory from ball to ball for the same player. When set to **NO**, the lit 'Special' light will go out at the end of each ball.
Adj. 47	Location ID	**00** to **9999**. Allows the operator to assign a location identification number to the audit print-out sheet. *(Will not be affected by Factory Reset.)*
		See the end of this Sec. 3, Chp. 3, Go To Audits Menu, & Chp. 5, Go to Reset Menu, for more details on Factory Reset & Printing.
Adj. 48	Game ID	**00** to **9999**. Allows the operator to assign a game identification number to the audit print-out sheet. *(Will not be affected by Factory Reset.)*
		See the end of this Sec. 3, Chp. 3, Go To Audits Menu, & Chp. 5, Go to Reset Menu, for more details on Factory Reset & Printing.



South Park Adjustments (49-56) + (57-59 Special Audit Adj.)

From the **ADJUSTMENTS MENU**, select the "PARK" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. Select and activate the "RIGHT ARROW" *Icon* to view the 1st adjustment in this group. Continue to select either of the "ARROW" *Icons* to view each adjustment one at a time. Select either the "-" or "+" *Icons* to change the value, if desired. The display will describe the adjustment number, the adjustment name, and the adjustment total or value. The current adjustment will remain in the display until the next adjustment is chosen or when the sub-menu is exited.

Adj. Nº	Adjustment Name	Adjustment Definition
Adj. 49	**Extra Ball Memory**	Set to **ON** or **OFF**. Default is **ON**. When set to **ON**, the lit 'Extra Ball' light will be retained in memory from ball-to-ball for the same player. When set to **OFF**, the lit 'Extra Ball' light will go out at the end of each ball.
Adj. 50	**MBall Restart**	Set to **EXEASY, EASY, MODERATE, HARD** or **EXHARD**. Default is **MODERATE**. Determines how Multiball can restart.
Adj. 51	**Multiball Criterion**	Set to **EXEASY, EASY, MODERATE, HARD** or **EXHARD**. Default is **MODERATE**. Determines how the Multiball Feature is started and played.
Adj. 52	**Toilet Mech Enabled**	Set to **YES** or **NO**. Default is **YES**. When set to **YES**, the Tank Lid Lift Coil (Mr. Hankey) is operational. When set to **NO**, the Coil on the assembly is disabled. Use the **NO** setting, if the Assembly is malfunctioning or is awaiting service and/or repair.
Adj. 53	**Kenny Mech Enabled**	Set to **YES** or **NO**. Default is **YES**. When set to **YES**, the Kenny Coils are operational. When set to **NO**, the Coils on the assembly are disabled. Use the **NO** setting, if the Assembly is malfunctioning or is awaiting service and/or repair.
Adj. 54	**UK Post Save Enabled**	**/////// THIS ADJUSTMENT CAN ONLY BE ADJUSTED IF THE GAME HAS THE UK EPROM INSTALLED FOR UK SETTINGS ///////** **Set to YES** or **NO**. Default is **NO**, (UK Default is **YES**). When set to **YES** this feature is available when lit. Set to **NO** to disable this feature. (UK Games have Outlane & Center Post Save Devices which are accessed in a different way. Domestic games should cannot adjust this setting.)
Adj. 55	**UK Coin Mech. Type**	**/////// THIS ADJUSTMENT CAN ONLY BE ADJUSTED IF THE GAME HAS THE UK EPROM INSTALLED FOR UK SETTINGS and HAS THE DIP SWITCH SETTING OPTION 2 SET (2,3, & 4 ON) ///////** **Set to CURRENT: 2 POUND AT #5** if using a Coin Control Mech 74-1129-104**U** (latest version). Set to **OLD: 2 POUND AT #6** if using older version Coin Control Mech 74-1129-104.
Adj. 56	**Adult Speech Enabled**	Set to **YES** or **NO**. Default is **YES**. When set to **YES**, the original game program Adult Graphic Sound & Speech is used. When set to **NO**, the Sound & Speech is suitable for the Family Style Environment.

☞ *Special equipment is required for these Adjustments*

The **Portals™ Service Menu System** provides 3 Audit Printing Adjustment Functions to print information on a "Hand-Held" printer, download game information to a Laptop PC or clear the printout count. A printer interface board, hand-held printer and/or a special software program is required to run this menu. Entering this menu and selection/activation of the *Icons* without this equipment/software will not affect the game.

Adj. 57	**Printer Interface (Quick Printout)**	For explanation see the end of Sec. 3, Chp. 3, Go To Audits Menu where this Adjustment can also be accessed via the "Go To Printer Menu."
Adj. 58	**Alison Interface (Full Printout)**	For explanation see the end of Sec. 3, Chp. 3, Go To Audits Menu where this Adjustment can also be accessed via the "Go To Printer Menu."
Adj. 59	**Nº of Copies Printed (Reset Printer)**	For explanation see the end of Sec. 3, Chp. 3, Go To Audits Menu where this Adjustment can also be accessed via the "Go To Printer Menu."

Custom Message

To go directly to ***Adjustment 34, Custom Message,*** from the **ADJUSTMENT MENU**, select the "CUST MSG" *Icon* either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. Set the feature to **CHANGE** selecting the "+" *Icon*. Using either of the Flipper Buttons or the **"RED"** and/or **"GREEN" Buttons**, select either of the **"ARROW"** *Icons*. Press the **"BLACK" Button** (*Request Installed* blinks at the top of the display and the letter **A** is indicated in the first position in the display. Vary the letter(s) by operating the Left and Right Flipper Buttons (or **"RED"** or **"GREEN" Buttons**). With the desired letter indicated, depress the **Start Button** to lock in the letter and advance to the next character. Repeat this procedure until the desired message is completed in the display. Select the "<" or ">" characters to back-space (erase) and/or to move forward in an already typed message. After completion, press the **"BLACK" Button**.

Film Star Reset

To reset the game with *Special Home Settings* (*not the normal Factory Setting*), from the **ADJUSTMENT MENU**, select the "STAR" *Icon* either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. This *Special Setting* automatically changes ***Adjustment 6, Game Difficulty,*** to **EASY** and ***Adjustment 33, Free Play,*** to **YES**. This setting is determined to be ideal for the home environment. See Chapter 5, Go to Reset Menu, of this section, to change to factory defaults if changes made are not desired.

RESETTING & PRINTING ADJUSTMENTS NOTES:

Adjustment Note: Resetting Adjustments

To reset adjustments, from the **MAIN MENU** select the "RESET" *Icon*. See Chapter 5, Go to Reset Menu, of this section.

Selection of the "FACT" *Icon*, from the **RESET MENU**, will reset all adjustments to the *Factory Settings* (except for Proprietary Adjustments). The display will return to the **Attract Mode**. To perform any other functions, the system must be entered again by pressing the **Black "BEGIN TEST" Button** on the coin door (see Chapter 1, Introduction, of this section).

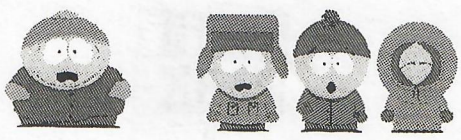
Adjustment Note: Printing Audit Information

To print audits, from the **AUDITS MENU** select the "PRNT" *Icon*. See Chapter 3, Go to Audits Menu, at the end of that section (*special equipment is required*).

Selection of the "QUIK" *Icon*, from the **PRINTER MENU**, will start a quick print.

Selection of the "ALISON" *Icon*, from the **PRINTER MENU**, will start a Full Printout (Downloads to a PC).

Selection of the "RESET" *Icon*, from the **PRINTER MENU**, will reset the total Nº of copies value to zero.



Go To Reset Menu

Overview

The **Portals™ Service Menu System** provides three (3) functions to reset adjustments and/or audits back to the *Factory Setting*. See Chapter 3, Go to Audits Menu, and Chapter 4, Go to Adjustments Menu, for the Game Audits & Adjustments Information. If a reset of ***Coin*** or ***Game Audits*** is performed, the display will indicate **REQUEST INSTALLED** and return to the **RESET MENU**. If a **Factory Reset** is performed, the display will indicate **REQUEST INSTALLED**, the ***Service Session*** is *exited* & returns to the ***Attract Mode***. Please note that once reset, all customized settings are lost! Certain *Audits & Adjustments* cannot be reset (refer to the details below).

GO TO RESET MENU

With the game in the Attract Mode, open the Coin Door and press the **Black "BEGIN TEST" Button**. Select the "RESET" *Icon* in the **MAIN MENU** with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. The **RESET MENU** appears.

Important Notes:

Exit any sub-menu and return to the **MAIN MENU** by selecting & activating the "PREV" *Icon*.

Selecting & activating the "QUIT" *Icon* from the display will exit the Service Session.

Selecting & activating the "HELP" *Icon* from the display will show a help screen. (An explanation of each *Mini-Icon* at that level will cycle continuously until any active button is pressed.)

Reset Coin Audits

From the **RESET MENU**, select the "COIN" *Icon* with either **Red** or **Green Button** and press the **Black Button**. ⚠ All Coin Audits (See **Fig. 1**) will be reset to Factory Settings. The display will indicate **REQUEST INSTALLED** and return to the **RESET MENU**. Coin Audits can also be reset from the **ADJUSTMENTS MENU, SEGA ADJUSTMENT 8**. See Chapter 4, Go to Adjustments Menu, of this section. After selecting this *Icon*, all of the ***Coin Audits (5-11)*** are reset to zero.

Reset Game Audits

From the **RESET MENU**, select the "AUD" *Icon* with either **Red** or **Green Button** and press the **Black Button**. ⚠ All Game Audits (See **Fig. 2**) will be reset to Factory Settings. The display will indicate **REQUEST INSTALLED** and return to the **RESET MENU**. Game Audits can also be reset from the **ADJUSTMENTS MENU, SEGA ADJUSTMENT 9**. See Chapter 4, Go to Adjustments Menu, of this section. After selecting this *Icon*, all of the ***Audits*** are reset to zero, except for the Coin Audits (Audits 5-11) and Audit 12, Software Meter. Audit 12 is the only audit which cannot be reset.

Fig. 1

• Reset Coin Audits	
Earnings Audits (Coin Audits Only 5-11)	
Au. №	Description
1-4	The first 4 Audits in the game.
5	Coins Thru Left Slot
6	Coins Thru Right Slot
7	Coins Thru Center Slot
8	Coins Thru 4th Slot
9	Total Coins
10	Total Earnings
11	Meter Clicks
12	Software Meter
13 +	The remainder of the Audits.

Fig. 2

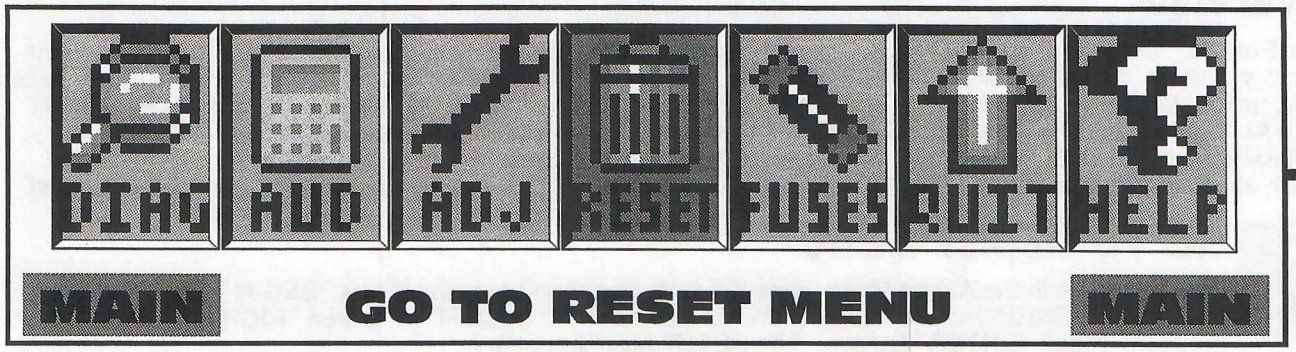
• Reset Game Audits	
Earnings (1-4), Generic/Specific Audits (13+)	
Au. №	Description
1-4	The first 4 Audits in the game.
5	Coins Thru Left Slot
6	Coins Thru Right Slot
7	Coins Thru Center Slot
8	Coins Thru 4th Slot
9	Total Coins
10	Total Earnings
11	Meter Clicks
12	Software Meter
13 +	The remainder of the Audits.

Factory Reset

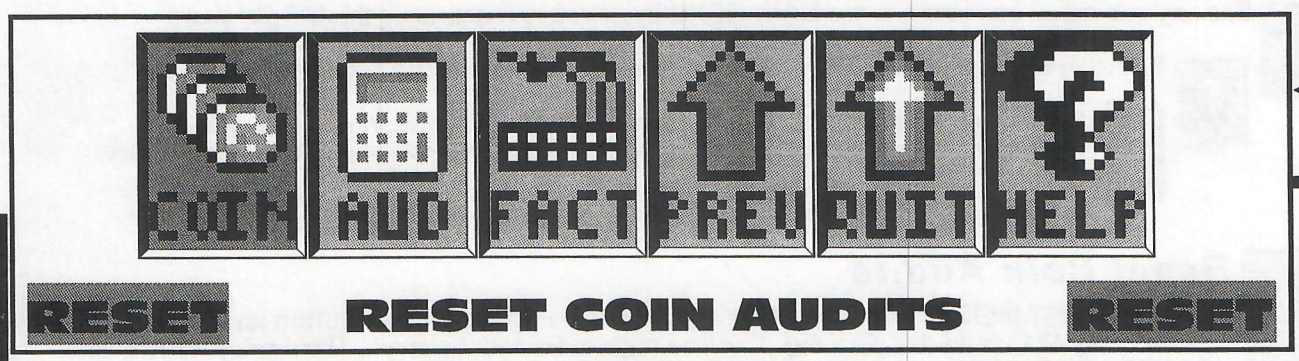
From the **RESET MENU**, select the "FACT" *Icon* with either **Red** or **Green Button** and press the **Black Button**. ⚠ All adjustments will be reset to *Factory Settings* (except for Proprietary Adjustments). The display will indicate **REQUEST INSTALLED** and exit the Service Session. See Chapter 4, Go to Adjustments Menu, of this section, for the *Factory Settings* in the **Game Adjustment Table**.

Example:

From the **MAIN MENU**, use the **Red** or **Green Buttons** to select the "RESET" *Icon* (**GO TO RESET MENU**).



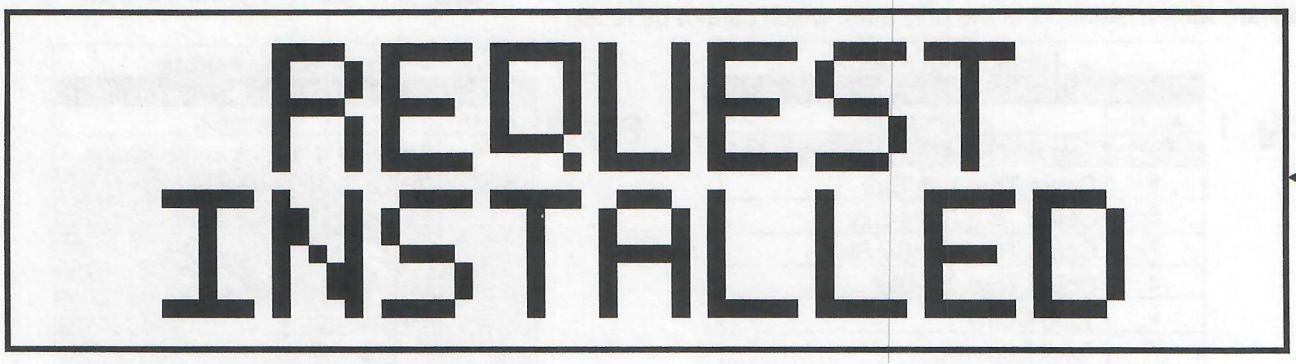
Press the **Black Button** to activate this **ICON**. This will bring up the **RESET MENU**.



The **RESET MENU** now appears with the "COIN" *Icon* (**RESET COIN AUDITS**) flashing:

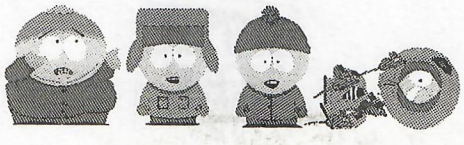
DO NOT PRESS THE START BUTTON **AFTER SELECTING ANY THREE OF THESE ICONS UNLESS THIS IS WHAT IS DESIRED (SETTINGS WILL BE LOST)! PLEASE READ THE PREVIOUS PAGE FOR EXACTLY WHAT WILL HAPPEN IF ANY OF THESE THREE ICONS ARE ACTIVATED.**

From the **RESET MENU**, select any of the *Icons* ("COIN", "AUD" or "FACT") with either **Red** or **Green Button** and press the **Black Button** to activate the **ICON** chosen.



If the "COIN" or "AUD" *Icons* are chosen and activated, the affected audits (see previous page) will be reset, the display will indicate **REQUEST INSTALLED** and the display will return to the **RESET MENU**.

If the "FACT" *Icon* is chosen and activated, all adjustments will be reset back to the *Factory Settings*. The display will indicate **REQUEST INSTALLED** (momentarily), the ***Service Session*** is automatically *exited* and returns to the ***Attract Mode***.



Go To Fuses List

Overview

The **Portals™ Service Menu System** provides a current Fuse List for this game. The fuses are located in the Backbox (on the Display Power Supply Board and the I/O Power Driver Board), and also in the Cabinet (under the playfield by the Flippers and/or by any unique assembly, such as magnets). See the front of this manual (page **DR. ❶**) for the complete Fuse List in the *Quick Reference Fuse Chart* and note the drawings.

GO TO FUSES LIST

With the game in the Attract Mode, open the Coin Door and press the **Black "BEGIN TEST" Button**. Select the "FUSES" *Icon* in the **MAIN MENU** with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. Select and activate the "RIGHT ARROW" *Icon* to view the 1st fuse in this group. Continue to select either of the "ARROW" *Icons* to view each fuse one at a time. The display will describe the fuse identification number (e.g. F1, F6, F7, etc.), location of fuse (i.e. Backbox: Board name located on; or Cabinet: Under the playfield or in Service Outlet), rating of fuse (e.g. 5A 250v S.B. - i.e. 5 Amp, 250 volt, Slo-Blo), and 'use of fuse' (e.g. 90v DC High Voltage Power, etc.). The current fuse listed will remain in the display until the next fuse is chosen or when the sub-menu is exited.

Important Notes:

Exit any sub-menu and return to the **MAIN MENU** by selecting & activating the "PREV" *Icons*. If no *Icons* appear in the display because of a testing function or special display (e.g. "Help"), press any button to exit.

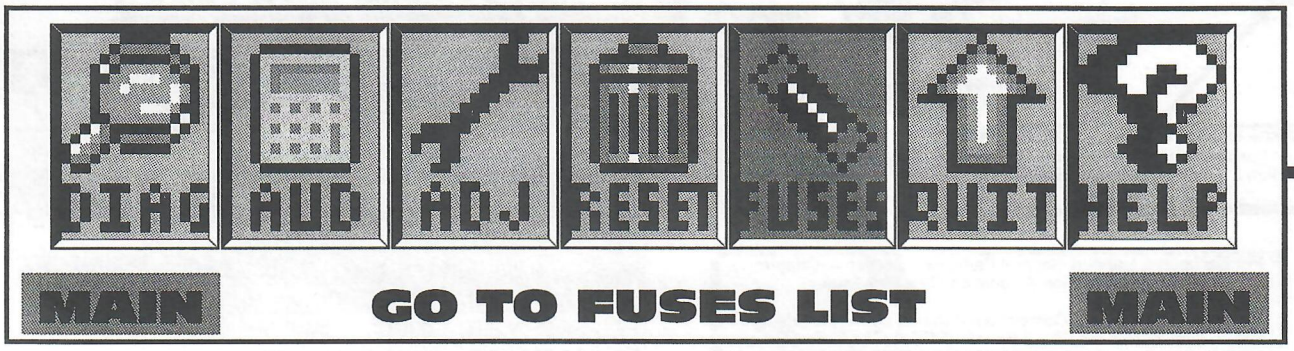
Selecting & activating the "QUIT" *Icon* from any display will exit the Service Session.

Selecting & activating the "HELP" *Icon* from any display will show a help screen. (An explanation of each *Mini-Icon* at that level will cycle continuously until any active button is pressed.)

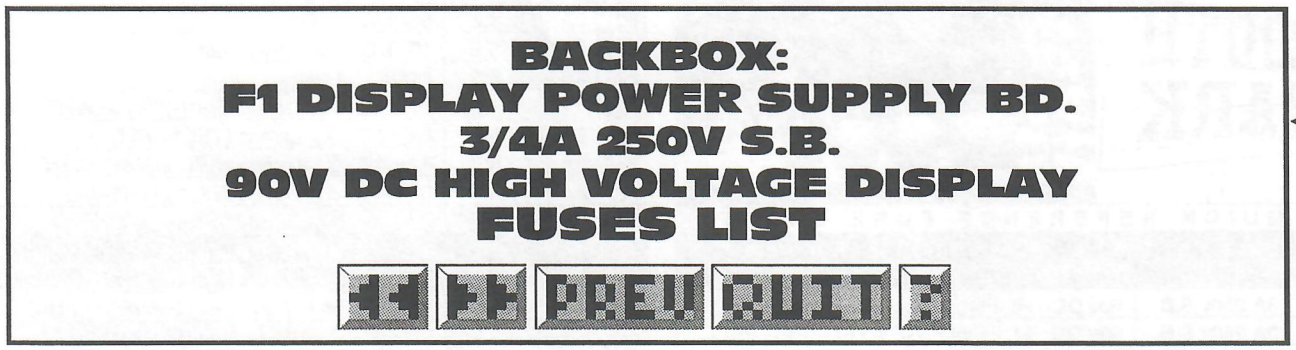
Selecting & activating the "ARROW" *Icons* selects the next or previous fuse in this group.

Example:

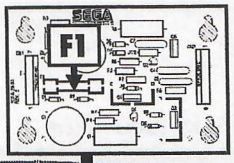
From the **MAIN MENU**, use the **Red** or **Green Buttons** to select the "FUSES" *Icon* (**GO TO FUSES LIST**).



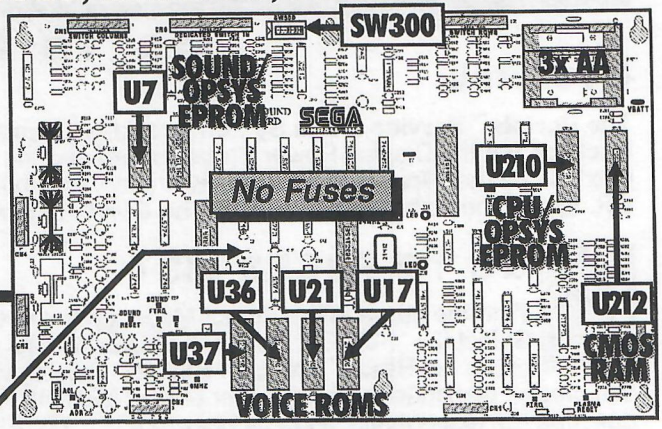
Press the **Black Button** to activate this **ICON**. This will bring up the **FUSES LIST**.



▼ BACKBOX LAYOUT LOCATIONS: FUSES, BRIDGES, RELAYS & ROMs ▼

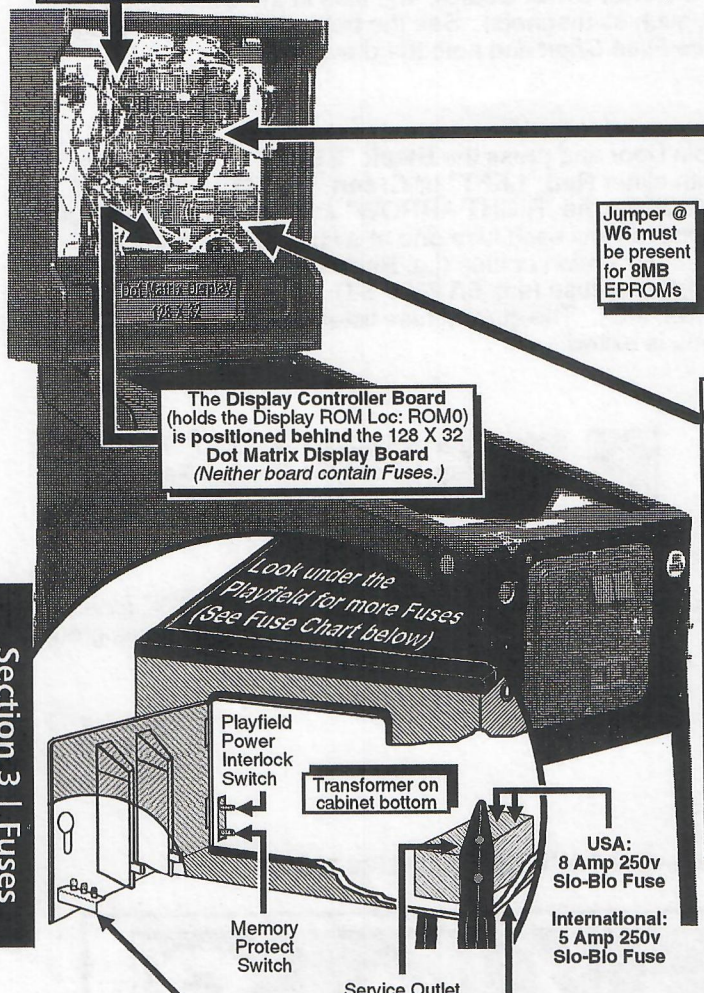


Display Power Supply Bd.



Jumper @ W6 must be present for 8MB EPROMs

CPU / Sound Board



The Display Controller Board (holds the Display ROM Loc: ROM0) **is positioned behind the 128 X 32 Dot Matrix Display Board** *(Neither board contain Fuses.)*

Look under the Playfield for more Fuses (See Fuse Chart below)

Playfield Power Interlock Switch

Transformer on cabinet bottom

USA: 8 Amp 250v Slo-Blo Fuse

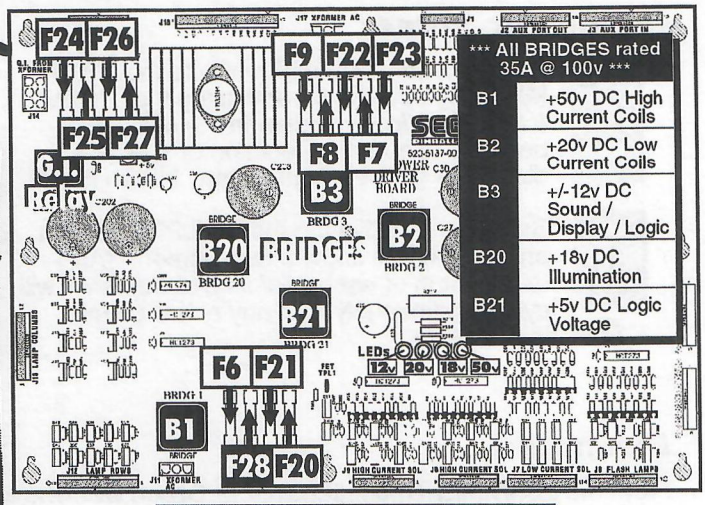
International: 5 Amp 250v Slo-Blo Fuse

Memory Protect Switch

Service Outlet (USA)

On/Off Switch (under cabinet)

Volume Control & Service Switches
For operational usage, see Section 3, Chapter 1, Portals Service Menu Introduction



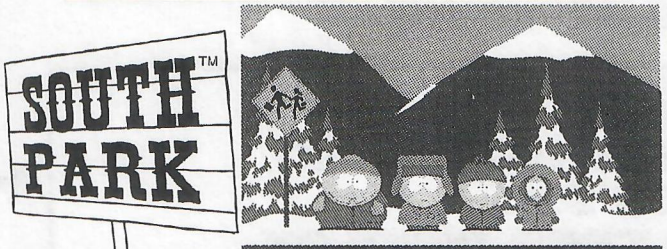
I/O Power Driver Board

CAUTION: *For continued protection against risk of fire, replace only with same type of fuse having the same electrical rating!*

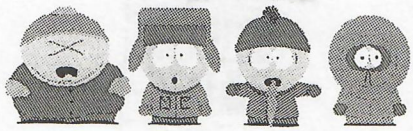
QUICK REFERENCE FUSE CHART			
Backbox Fuses			
LOC:	DISPLAY POWER SUPPLY (P.S.) BOARD		
F1	¾A 250v S.B.	90v DC	High Voltage Display
LOC:	I / O POWER DRIVER BOARD		
F6	7A 250v S.B.	50v DC	Primary High Power Coils/Flippers
F7	5A 250v S.B.	20v DC	Low Power Coils
F8	5A 250v S.B.	12v DC	Logic Power
F9	5A 250v S.B.	12v DC	Logic Power
F20	3A 250v S.B.	50v DC	Magnets
F21	3A 250v S.B.	50v DC	Coils
F22	8A 250v S.B.	18v DC	Controlled Lamps
F23	4A 250v S.B.	5v DC	Logic
F24	5A 250v S.B.	6.3v AC	G.I. Lamps (BRN-WHT to WHT-BRN)
F25	5A 250v S.B.	6.3v AC	G.I. Lamps (YEL to WHT-YEL)
F26	5A 250v S.B.	6.3v AC	G.I. Lamps (GRN to WHT-GRN)
F27	5A 250v S.B.	6.3v AC	G.I. Lamps (VIO to WHT-VIO)
F28	3A 250v S.B.	24v AC	**Not Used / Spare**
Cabinet Fuses			
LOC:	SERVICE (AC) OUTLET BOX (Cabinet Bottom)		
n/a	8A 250v S.B.	115v AC	Main Fuse Line (Domestic or USA)
n/a	5A 250v S.B.	220v AC	Main Fuse Line (International)

For Backbox & Cabinet General Parts, see Section 4, Chapter 1, Parts Identification & Location (The Pink Pages)

For Schematics and/or Component Parts on above Boards, see Sec. 5, Chp. 4, Printed Circuit Boards (PCBs) (The Yellow Pages)



QUICK REFERENCE FUSE CHART			
South Park Playfield Fuses			
LOC:	UNDER PLAYFIELD (By Assemblies Listed)		
n/a	3A 250v S.B.	50v DC	Rt. Flipper (BLU-YEL↔RED-YEL)
n/a	3A 250v S.B.	50v DC	Lt. Flipper (GRY-YEL↔RED-YEL)



Go To Help Screen

Overview

The **Portals™ Service Menu System** provides help screens in each display (except if the display is in a testing mode). Each screen is basic and some terms may vary. At the beginning of each chapter in this section, *Icons* are shown and described to give detail of the particular function of the individual *Icons*. The table on the previous page was designed to help answer some questions of situations which may arise.

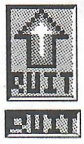
GO TO HELP SCREEN

With the game in the Attract Mode, open the Coin Door and press the **Black "BEGIN TEST" Button**. Select the "HELP" *Icon* in the **MAIN MENU** with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. The **HELP SCREEN** appears cycling through the different icon usages pertinent to that menu level.

MENU HELP SCREEN
USE THE RED OR GREEN BUTTONS TO CHANGE THE SELECTED ICON. PRESS THE BLACK BUTTON TO ACTIVATE THE SELECTED ICON. THE FLIPPER & START BUTTONS FUNCTION IN THE SAME WAY.

Important Notes:

Exit any sub-menu and return to the **MAIN MENU** by selecting & activating the "PREV" *Icons*. If no *Icons* appear in the display because of a testing function or special display (e.g. "Help"), press any button to exit.



Selecting & activating the "QUIT" *Icon* from any display will exit the Service Session.

Selecting & activating the "HELP" *Icon* from any display will show a help screen. (An explanation of each *Mini-Icon* at that level will cycle continuously until any active button is pressed.)

These "Mini-Icons" vary in functionality depending in what sub-menu they are used. Refer to the beginning of each chapter in this section for the function they serve in that menu or select the "HELP" *Icons* in the display where the *Icon* in question is being used.

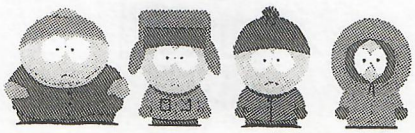
Review Chapter 1, Introduction:	How to enter the **Portals™ Service Menu**. The chapter outlines the entire **Portals™ Service Menu**. View the **Icon Tree** in this manual which describes the names and menu descriptions of each *Icon*. View the display, after selecting and activating either of the "HELP" or "?" *Icons*.
Review Chapter 2, Go to Diagnostics Menu:	Find all the tests needed to troubleshooting the game.
Review Chapter 3, Go to Audits Menu:	Gather play information and printing functions (downloading).
Review Chapter 4, Go to Adjustments Menu:	Customize the game to vary difficulty of play or to change functions of the game.
Review Chapter 5, Go to Reset Menu:	Reset audits and adjustments to Factory Settings.
Review Chapter 6, Go to Fuses Menu:	View the location & descriptions of the game fuses (the same information is referenced in the Fuse Chart Table on DR. ❶).

This concludes the **Portals™ Service Menu**. Review the Table of Contents at the beginning of this manual, and the detailed Table of Contents for Section 3 to quickly find the information required. The remainder of the sections in this manual will cover all the parts in this game and provide helpful information to aide in troubleshooting. If questions still arise after reading this section completely, call our Technical Support Department.

PROBLEM/SOLUTION TABLE

Use this table for a quick simple solution(s) guide. For more technical assistance view Section 5.

PROBLEM	SOLUTION
Will not enter the Service Mode after depressing the **Black "BEGIN TEST" Button.**	• Check the Service Switch(es) (**Red, Green & Black Buttons**) for loose connections or bad Ground. • Check the associated wiring harness to/from the CPU Board Connector CN14. • Check CPU Board, possibly failed.
Service Buttons (**Red, Green** and **Black**) are nonfunctional.	• Check the Service Switches for poor connections or broken wires.
The display blanks out.	• Check the Dot Matrix Display for loose wiring harness connections. • Check Bridge Rectifier 3 & 8 Amp Slo Blo Fuse. Refer to Section 5, Chapter 4, Schematics & Troubleshooting.
Icons "*scroll*" along continuously in the **MAIN MENU**.	• If the Service Switch Set and/or the Coin Door was replaced, ensure the Locking Mechanism on the **Green Button** is removed. If the Green Button "clicks" and locks into an up/down position, the Green Button has this lock switch. Remove it. (Ref. to Service Bulletin #74.)
The **Start** and **Flipper Buttons** do not select or activate *Icons* in the **SWITCH TEST MENU**.	• This is normal. These switches are deactivated, as they are a part of the Switch Test. Use the **Red "LEFT" or Green "RIGHT" & Black "ENTER" Buttons** in this Sub-Menu (See Chapter 1).
Can't move selection of *Icon* with the **Left** and/or **Right Flipper Buttons**.	• Check the **Flipper Buttons** for loose connections or bad Ground and refer to the Game Manual Flipper Troubleshooting Flowchart. • This is normal ***only*** in Diagnostic's Switch & Active Switch Tests (see previous Problem).
Some *Icons* appear non-functional in the **PRINTER MENU(S)**.	• If no printing equipment is connected, the "-" *Icon*, "+" *Icon* and "RUN" *Icon* will appear not to function (See Chapter 5).
Some *Icons* appear non-functional in the **GAME SPECIFIC MENU** under the **DIAGNOSTICS MENU**.	• If there is no other test under this Menu, the "Left Arrow" & "Right Arrow" *Icons* will appear not to function. The remaining *Icons* should function as normal. Note: If there is no Game Specific Special Test, the "**GAME SPECIFIC**" *Icon* will not invoke another display.
The display returns to the **ATTRACT MODE** exiting the Service Session from the **FACTORY RESET MENU**.	• This is normal. After a **FACTORY RESET**, the Service Session is automatically exited (See Chapter 4 (end) or Chapter 6).
In **COIL TEST MENU**, the coils and flashlamps ***do not*** fire after activating the "RUN" *Icon*.	• Ensure the **POWER INTERLOCK SWITCH** (See figure on front inside cover) ***is pulled out***.
In **Portals™ Service Menu**, the volume cannot be adjusted with the **Red** or **Green Buttons**.	• The Volume adjustment can only be made when the Service Menu is exited. The **Volume Mode** is entered by pressing the **Red "VOLUME" Button.** Then use the **Red** or **Green Button** to increase/decrease volume. (Red "LEFT" decrements; Green "RIGHT" increments.)
In **Portals™ Service Menu**, the display seems to lock up, or the Help Display appears to be non-functional.	• If you cannot clear the situation by exiting back one Menu, exit completely out of the **Portals™ Service Menu**, and re-enter. If the problem persists, call Tech. Support for additional help.



Parts Identification & Location (The Pink Pages)

Overview

This section provides the part numbers and locations of all the components in the pinball machine. The parts are arranged in basically 3 groups: Backbox, Cabinet, and Playfield. Generic parts which may change as production continues (quantity and/or size) are listed together. Quantities greater than 0 indicates that the part is used in this game. Since quantity changes *may occur*, an item indicating "0" may be used. Compare the item which needs to be replaced with the drawings provided (the posts, sockets, bulbs and rubber rings are drawn actual size). Major Assemblies & Ramps are detailed in the Blue Pages, Chapter 2. **Important:** Read all "**Take Note:**" items.

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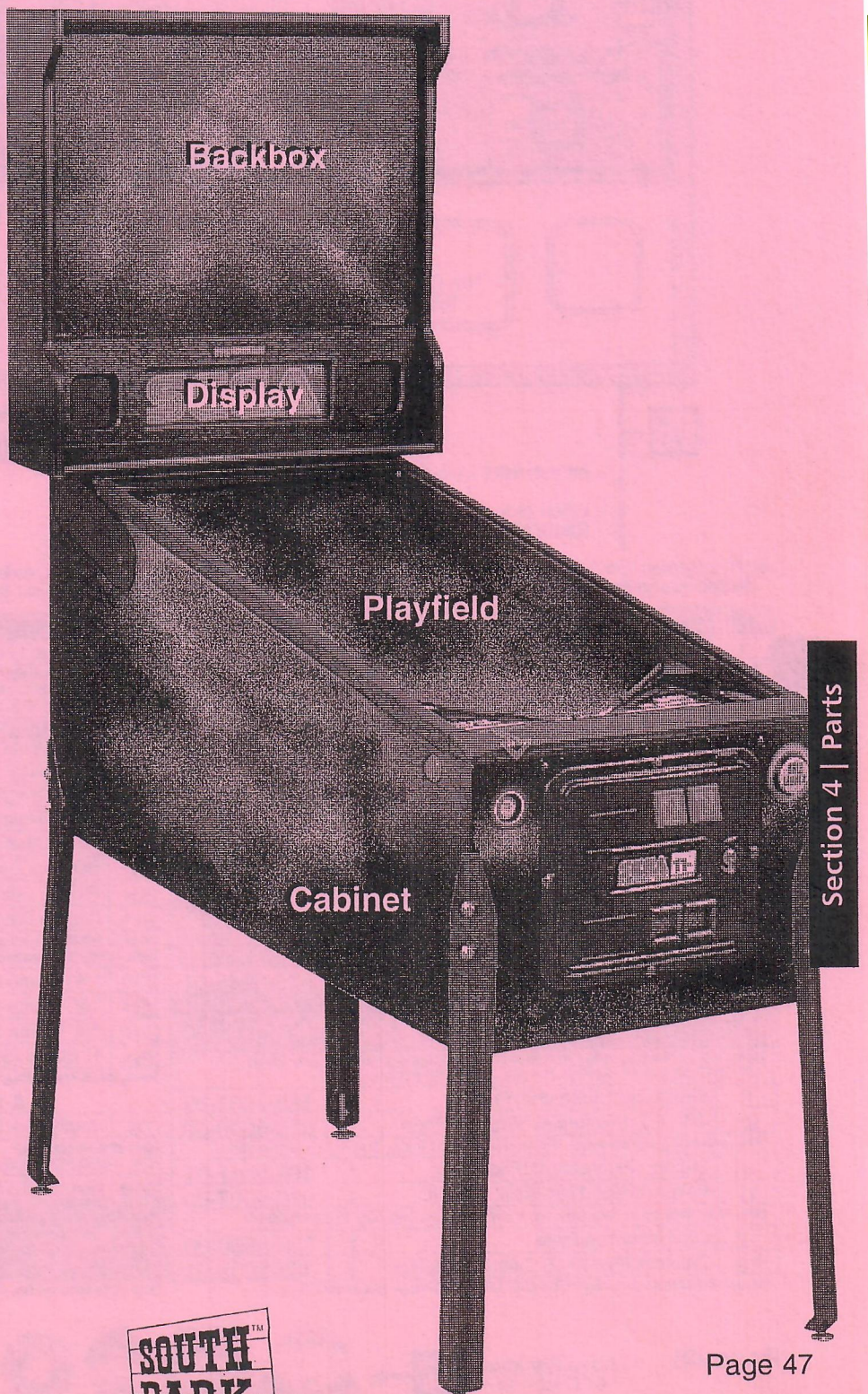
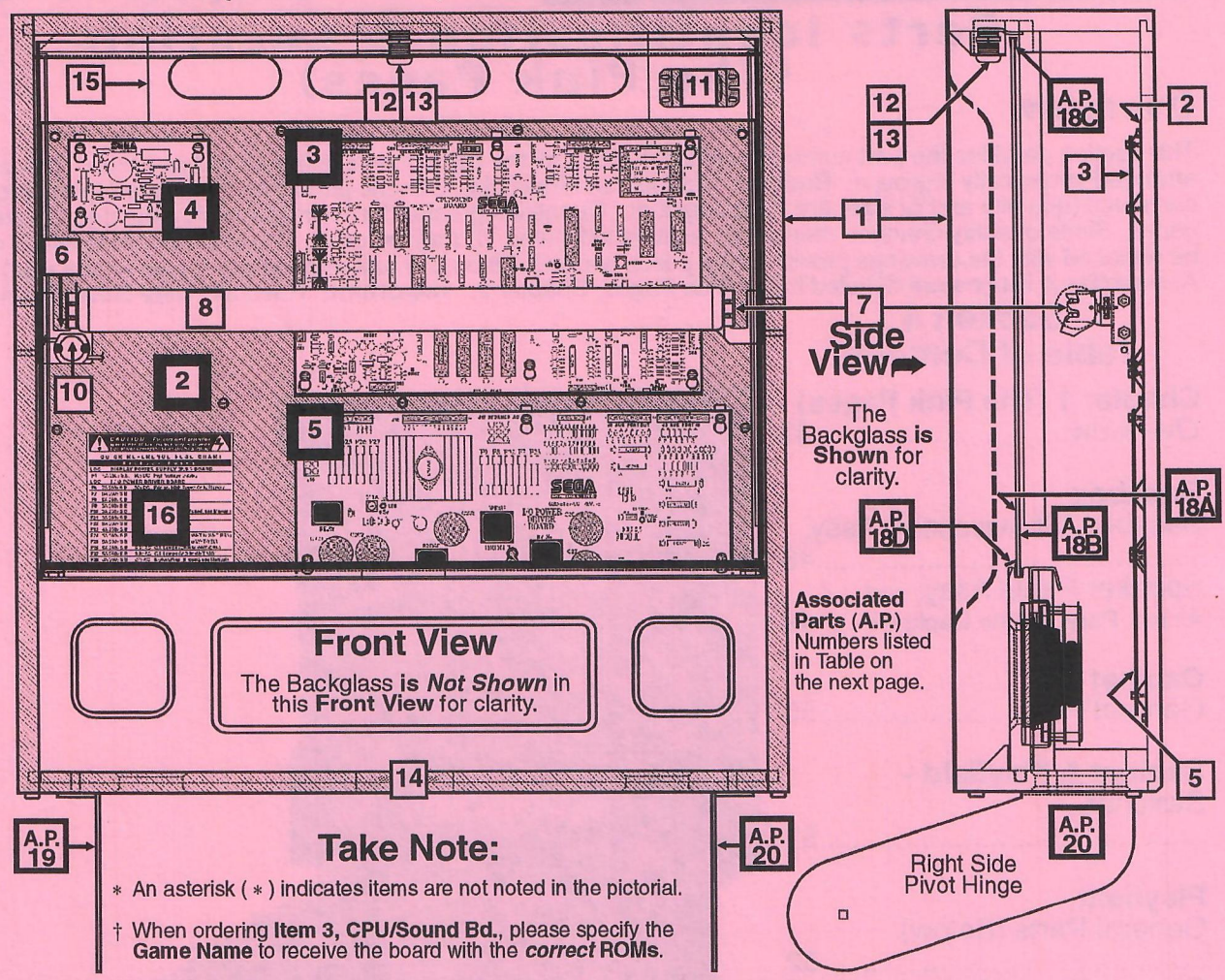


Backbox (Showcase II) Assembly, 505-6002-71-71 (Items 1-27)

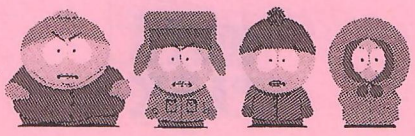


® "R" indicates item has a riveted-on part(s), if removing/adding rivets is not an option, order the entire ® Sub-Assembly. ***Please Note:*** If the ® Sub-Assembly **Is not** available, call Technical Support.

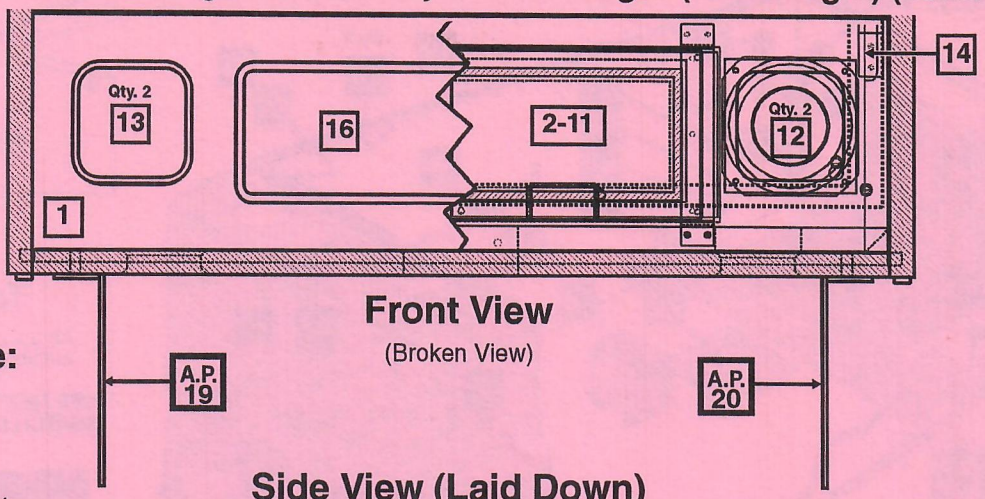
№	Individual Part Name (Back)	QTY.	SPI Part №
1	Backbox Showcase II (Wood)	1	525-5505-20
Item 1 is Screened with South Park Art; **Item 1** comes with Black T-Molding installed.			
2	PCB Metal Mounting Plate	1	535-5809-04
Item 2 is secured to Item 1 by: #8 X 1/2" HWH AB (Zinc) Blue (Qty. 8) (234-5101-05)			
3 †	CPU/Sound Board (Mono) FCC-FEB98	1	520-5136-16
4	Display Power Supply Board	1	520-5138-00
5	I/O Power Driver Board	1	520-5137-01
Items 3, 4 & 5 are secured to Item 2 by: #8-32 X 3/8" HWH MS (Qty. 19) (237-5903-00)			
6	Fluorescent Light Bracket Assy. Left	1	515-6545-00
ORDERING ABOVE (ITEM 6) SUB-ASSY. PART № WILL INCLUDE:			
6A	Fluorescent Light Bracket Left	1	535-7739-01
6B	Lamp Holder (Self-Locking)	1	077-5214-00
6C	#6-32 X 5/8" PPH MS (Sems) Zinc	1	232-5203-00
6D	Starter Base (with Leads)	1	077-5213-00
6E	#4-40 X 1/2" PPH MS (Sems) Zinc	2	237-5813-00
7	Fluorescent Light Bracket Assy. Right	1	515-6545-01
ORDERING ABOVE (ITEM 7) SUB-ASSY. PART № WILL INCLUDE:			
7A-7B-7C	Fluorescent Light Bracket Right Identical to Items 6B-6C above.	1	535-7739-00 See 6B-6C
Items 6 & 7 are secured by: #10-24 X 1-1/4" Carriage Bolt Sq. Neck (Qty. 2/per) (231-5012-00) **and** #10-24 Keps Nut (Qty. 2/per) (240-5207-00)			
8	Fluorescent Tube (F20T12CW)	1	165-5031-02
9*	3/4" X 3" Reinforced Strapping Tape	1	626-5040-00
Above Item 9 is self-adhesive. It is located on Items 6 & 7. Sold in 12" Lengths only.			
10	Starter - Fluorescent (FS2 Light)	1	165-5011-01
11	Ballast SP2/A 120v 60Hz 13W UL	1	010-5007-00
Item 11 is secured to Item 1 by: #6 X 3/8" HWH AB (Zinc) (Qty. 2) (234-5000-00)			
12	Lock Mounting Plate	1	535-5860-00
13	Camlock (9231D-2) Cam 430V & Key	1	355-5008-01
Items 12-13 are secured by: #8 X 5/8" TP Torx T20 (Qty. 2) (237-5947-00)			

№	Individual Part Name (Back)	QTY.	SPI Part №
14	#1 Roto Lock Female (R2-0002-02)	1	355-5006-02
Item 14 is secured by: #10-24 X 1-3/4" CBSN (Qty. 1) (231-5022-00), #10-24 X 2" CB (Blk) (Qty. 1) (231-5045-00), #10-24 Keps Nut (Qty. 2) (240-5207-00) **and** #10 Washer 7/32" ID X .5" OD X 1/16" (Qty. 2) (242-5003-00)			
Note:	#1 Roto Lock Male (on Cabinet)	*1*	*355-5006-01*
15	Back Vent Grill 2-1/2" X 18"	1	545-5072-02
Item 15 is secured by: Staple 5/16" (Qty. 24) (631-5000-00)			
16	Fuse Description Decal (Generic)	1	820-6152-00
17*	Fuse Description Decal Game № 71	1	820-6152-71
18*	Fuse Label (UL)	1	820-6143-00
19*	Backbox Date Label	1	820-5091-00
20*	Ribbon Cable, 20-Pin	1	036-5000-04
21*	Ribbon Cable, 26-Pin	1	036-5001-80
Item 20 (20-Pin) connects the CPU/Sound Board to the I/O Power Driver Board. **Item 21 (26-Pin) connects** the CPU/Sound Board to the Display Controller Board.			
22*	1/4" Clamp (Double)	3	040-5000-23
23*	1/2" Clamp (Single)	1	040-5000-06
24*	3/4" Clamp (Single)	3	040-5000-08
25*	1" Clamp (Single)	5	040-5000-09
Items 22-25 secured by: #8 X 1/2" HWH AB (Zinc) Blue (Qty. 12) (234-5101-05)			
BACKBOX HEADERS:			
26	South Park Cartman (6" Figurine)	1	880-5031-00
Item 26 is secured by: 1/4"-20 X 2" PPH Bolt (Qty. 1) (237-6000-00), 1/4" Toggle Wing Nut (Qty. 1) (240-5324-00) **and** Washer 1/4" ID X 1" OD X .049" Thk. (Qty. 1) (242-5009-00)			
27®	Riveted Backbox Sign Disclaimer	1	515-7008-00-71
ORDERING ABOVE ® RIVETED ASSY. PART № WILL INCLUDE:			
27A*	Screened Plastic Piece (Words) -22	1	830-5967-22
27B*	Sign "L" Bracket	2	535-6072-00
27C*	Rivet, 1/8" ø X 3/16" Lg. (2/per)	4	234-5003-00
Item 27 is secured by: #6 X 3/4" HWH AB (Zinc) (Qty. 2) (234-5003-00)			

Above Backbox: 6" Cartman **26**



Speaker Panel Assy. for the Backbox (Showcase II), 515-6888-00 (Items 1-17) and Assoc. Parts: Backglass Assembly & Pivot Hinges (Left & Right) (Items 18-20)



Front View
(Broken View)

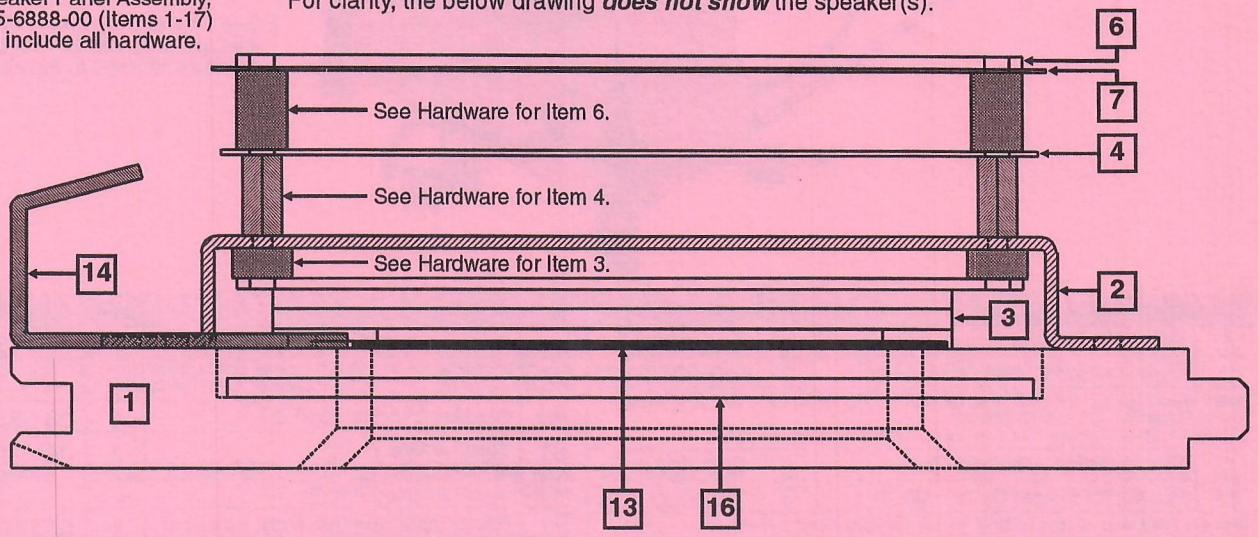
Take Note:

* An asterisk (*) indicates items are not noted in the pictorials.

1. Ordering the complete Speaker Panel Assembly, 515-6888-00 (Items 1-17) will include all hardware.

Side View (Laid Down)

For clarity, the below drawing ***does not show*** the speaker(s).



Nº	Individual Part Name (Front)	QTY.	SPI Part Nº
1	Speaker Panel (for Showcase II)	1	525-5515-00
2	Dot Matrix Disp. Bd. Mounting Bracket	2	535-8368-01
	Item 2 secured to Item 1 by: #8 X 3/4" HWH AB (Zinc) (Qty. 4/per) (234-5103-00)		
3	Dot Matrix Display Board 128 X 32	1	520-5052-00
	Item 3 secured to Item 2 by (at corners): 3/16" X 3/8" Spacer Gray (Qty. 4) (254-5000-18) **and** #6-32 X 1/2" HWH Swage (Serr) Zinc (Qty. 4) (237-5976-03) **Item 3 secured to Item 4 (at the top center) by:** 3/4" X 1/4" Hex Spacer #6-32 Tap (Qty. 1) (254-5008-04) **and** #6-32 X 1/4" PPH MS (Sems) Zinc (Qty. 1) (232-5200-00)		
4	Static Shield (Steel Plate)	1	535-6437-00
	Item 4 secured to Item 2 by: 1/2" X 1/4" Hex Spacer #6-32 Tap (Qty. 4) (254-5008-03) **and** #6-32 X 1/2" PPH MS (Sems) Zinc (Qty. 2, on Left Side only) (232-5202-00)		
5*	Edge Protector (on Item 4)	2	545-5592-01
6	Display Controller Board FCC-FEB98	1	520-5055-03
	Item 6 secured to Item 4 by: 1/2" X 5/16" X .144 ID Spacer Tap (Qty. 3) (254-5014-00), #6-32 X 3/4" PPH MS (Sems) Zinc (Qty. 3) (237-5504-00), 1/2" X 1/4" Hex Spacer #6-32 Tap. (Qty. 1) (254-5008-03) **and** #6-32 X 1/4" PPH MS (Sems) Zinc (Qty. 2) (232-5200-00)		
7	RF Shield	1	820-5092-00
	Item 7 Is secured Inbetween: "Item 6" and its' mounting hardware described.		
8*	Ground Strap (25") (on Items 4,6, 12)	2	600-5006-25
9*	1/2" Clamp (Single) (on Item 4)	1	040-5000-06
10*	Ribbon Cable, 14-Pin	1	036-5260-00
	Item 10 (14-Pin) connects the Dot Matrix Disp. Board to the Disp. Controller Board.		
11*	Foam 3/16" Thk. X 1/4" X 36"	3	626-5026-00
	Above Item 11 is self-adhesive. Located between Items 3 & 17. Sold in 12" Lengths only.		
12	Speaker (Shld.) 4" 8Ω MG Elec #4060SH	2	031-5004-01
13	Speaker Grill (Black w/no Artwork)	2	535-8081-00

Nº	Individual Part Name (Front)	QTY.	SPI Part Nº
14	Speaker Panel Hook Bracket	2	535-7009-02
	Items 12, 13 & 14 secured by: #8 X 3/4" HWH AB (Zinc) (**Items 12/13:** Qty. 4/per; **Item 14:** Qty. 2/per) (234-5103-00)		
15*	Sega Logo (self-adhesive)	1	535-7877-00
16	Plastic Shield (Display Cover)	1	545-5884-00
	Item 16 secured to Item 2 by: #6 X 3/8" HWH AB (Zinc) (Qty. 8) (234-5000-00)		
17*	Ground Strap (41")	2	600-5006-41

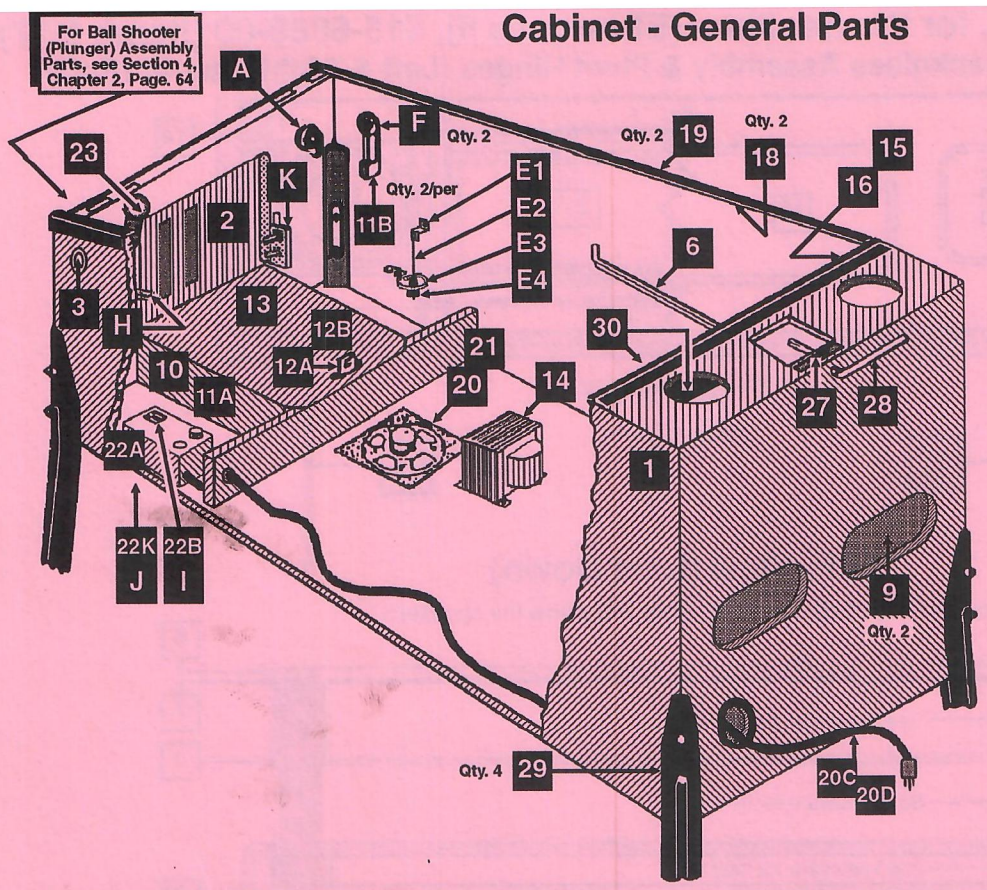
The Associated Parts A.P. 18-20 are also noted in the Backbox (Showcase II) Assy. drawings on the previous page.

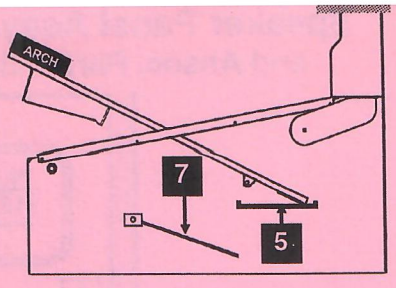
ASSOC. PARTS **ARE NOT INCLUDED** WITH BACKBOX/SPKR. PANEL ASSY'S.

Nº	Assoc. Backbox Part Name	QTY.	SPI Part Nº
18	Backglass Assembly (Game Nº 71)	1	515-5450-00-71
	ORDERING ABOVE (ITEM 18) SUB-ASSY. PART Nº WILL INCLUDE:		
18A	Clear Backglass 25.906" X 19.187"	1	660-5038-02
18B	Screened Film (Game Nº 71)	1	830-5271-00
18C	Top Plastic Channel - 26"	1	545-5018-15
18D	Bottom Plastic Lift Channel - 26-1/16"	1	545-5021-01
18E*	Plastic Edging (Left/Right) - 18-1/8"	2	545-5018-14
18F*	Tape (double-sided) (12" Length) *Note: 18F secures 18E to 18A*	1/2	626-5005-00
19	Pivot Hinge Left	1	535-7999-00
20	Pivot Hinge Right	1	535-7999-01

Items 19 & 20 secured to Backbox by: 1/4"-20 X 1-1/4" C.B. Sq. Neck (Qty. 4) (231-5003-00) **and** 1/4"-20 Flange Nut (Qty. 4) (240-5300-00)
Items 19 & 20 secured to Cabinet by: 1/4"-20 X 7/8" Carriage Bolt Sq. Neck (Qty. 2) (231-5014-00), Hinge Spacer (Qty. 2) (530-5099-00), Washer 1/4" I.D. X 7/8" O.D. X 1/8" Yellow (Qty. 2) (242-5016-01), Washer 1/4" I.D. X 1" O.D. (Qty. 2) (242-5009-00) **and** 1/4"-20 Flange Nut (Qty. 2) (240-5300-00)

Cabinet - General Parts





Take Note:

* An asterisk (*) indicates items are not noted in the pictorial.

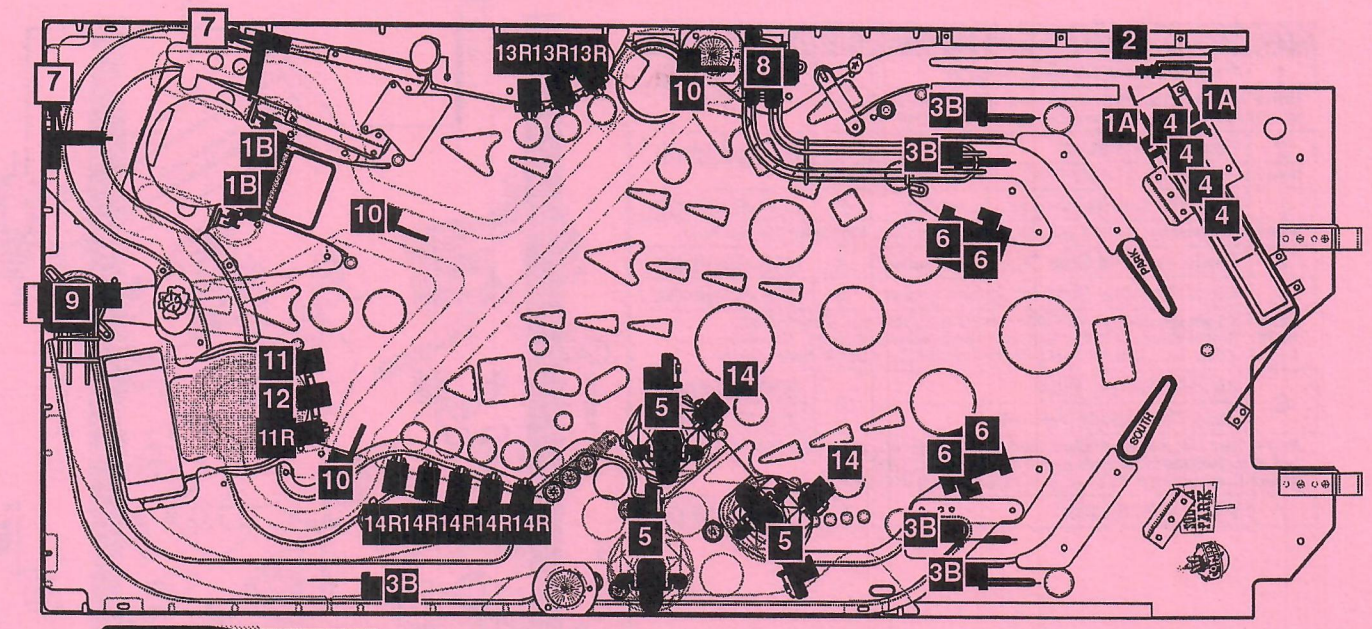
1. **SEE NEXT PAGE FOR CABINET SWITCH NAME PART Nº TABLE A-K.**

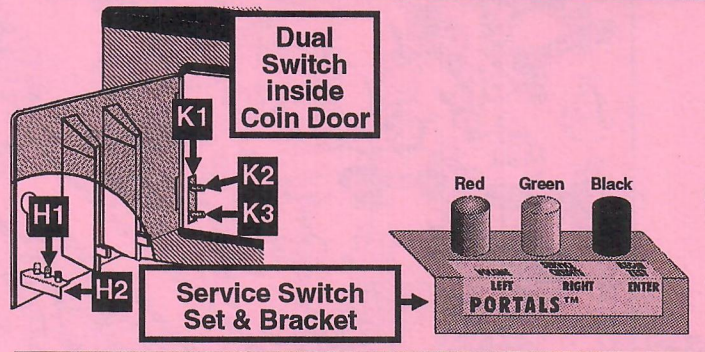
2. See Playfield - General Parts (Below), Page 58, for associated brackets attached to the playfield.

Nº	Cabinet Part Name	QTY.	SPI Part Nº
1	Game 71 Screened Cabinet (Plain)	1	525-6000-71
2	Coin Door (with Validator) USA only	1	500-5018-172
	Item 2 is secured by: 1/4"-20 X 1-1/4" Carriage Bolt Sq. Neck (Qty. 4) (231-5003-00) **and** 1/4"-20 Flange Nut (Qty. 4) (240-5300-00) ***NOTE:*** *For Coin Door other than USA call Technical Support for SPI Part Nº.*		
3	Flipper Button Assembly Red	2	500-5026-32
4*	Pal Nut for Flipper Button (Metal)	2	240-5003-01
	Item 4 is fitted with: O-Ring 11/32" X 7/32" X 1/16" (Qty. 1/per) (545-5850-00)		
5	Slide & Pivot Support Bracket - Right	1	535-5989-00
6	Slide & Pivot Support Bracket - Left	1	535-5990-00
	Items 5 & 6 are secured by: #10-24 X 1-1/4" Carriage Bolt Sq. Neck (3/per) (231-5012-00) **and** #10-24 KEPS Nut (3/per) (240-5207-00)		
7	Prop Rod	1	535-7553-00
	Item 7 is secured by: #10-24 X 1-3/4" Carriage Bolt Sq. Neck (231-5022-00), Washer #10 7/32" ID X .5" OD X 1/16" Thk **and** #10-24 Nylon Stop Nut (240-5206-00)		
8*	Mylar Carriage Bolt Cover Disc	2	820-5041-00
9	Grills 2-1/2" X 18" (on Back & Bottom)	2	545-5072-02
10	Cash Box Plastic Bottom	1	545-5090-00
11A	1/2" X 3/4" X 1-1/2" Black Foam Rubber Tape	1	626-5004-00
	Above Item 11A is self-adhesive. It is located behind Item 10. Sold in 12" Lengths only.		
11B	Foam Strip (2/per Flipper Switch Front/Back)	4	626-5042-00
12A	Cash Box Lock Bracket (wire)	1	535-7562-00
12B	Large Hair-Pin Clip	1	535-7772-00
13	Cash Box Cover (Validator)	1	535-5013-03
14	Transformer with Ballast Winding	1	010-5012-00
	Item 14 is secured by: 1/4"-20 X 5/8" PPH MS (Zinc) (Qty. 4) (237-5854-00) **and** 1/4" Split Lock Washer (Qty. 4) (244-5000-00) ***Item 14 Specifications:*** *PRI 103.5 / 115 / 207 / 230V 50/60Hz 750VA Class 130 EPB0*		
15	Rear Glass Channel 20-3/8" Length	1	545-5038-00
16	Foam Rubber 3/8" X 3/16" X 20-3/8"	2	626-5001-00
	Above Item 16 is self-adhesive. It is located in Item 15. Sold in 12" Lengths only.		
17*	Corrugated Tubing 1¼" ø (Black), (12")	2	605-5008-00
	Above Item covers the Cables Wiring Harnesses going into the Backbox from the Cabinet. Sold in 12" Lengths only.		
18	Plastic Channel 42-5/8" Lg. (Lt. & Rt.)	2	545-5017-00

Nº	Cabinet Part Name	QTY.	SPI Part Nº
19	Side Armor "with holes" (Lt. & Rt.)	2	535-7297-02
	Item 19 is secured by: #10-24 X 1" Carriage Bolt Sq. Neck (2/per) (231-5021-00), #10-24 Hex Nut (2/per) (240-5202-00) **and** #8 X 5/8" T20 Tamper Proof (237-5947-00)		
20	Speaker 8" ø Rd. 8010 4Ω	1	031-5007-00
21	Speaker Grill 7" X 7"	1	545-5072-03
	Items 20 & 21 are secured by: #6-32 X 1-1/4" Fin Shank Screw (Qty. 4) (237-5883-00) **and** #6-32 Keps Nut (Qty. 4) (240-5008-00)		
22	Power Input Box Sub-Assy. (no Vol. pot)	1	515-5360-02
	ORDERING ABOVE (ITEM 22) SUB-ASSY. PART Nº WILL INCLUDE:		
22A	Power Box (Plain)	1	535-5932-00
22B	Service Outlet (for USA)	1	180-5008-01
22C	Line Cord 10' ROJ 3" Max.	1	034-5000-10
22D	Recessed Cup for Line Cord	1	545-5122-00
22E*	Line Filter	1	150-5000-00
22F*	Varistor TNR159211KM	1	150-5001-00
22G*	Fuse 8 Amp 250v Slo-Blo (Domestic)	1	200-5000-05
22I*	Fuse Holder	1	205-5001-00
22J*	On/Off Switch Bracket	1	535-8318-00
22K	On/Off Rocker Sw. (Arcolectric C1350AB)	1	180-5001-01
22L*	Power Box + Supplement Decals	1/1	820-6123-01/-04
22M*	Fuse Label UL Decal	1	820-6143-00
23	Front Molding Lockdown Assembly	1	500-5020-01
	Item 23 is secured by: #10-24 X 1-1/4" Carr. Bolt (Qty. 2) (231-5012-00), #10-24 Keps Nut (Qty. 2) (240-5207-00) **and** #10 Washer 7/32" ID X 1/2" OD X 1/16" (Qty. 2) (242-5003-00)		
24*	Front Molding Lockdown Spring	1	265-5008-00
25*	Front Molding - Black	1	500-5757-01-00
26*	P/F Glass (Tmprd.) 21" X 43" X 3/16"	1	660-5001-00
27	#1 Roto Lock Male	1	355-5006-01
	Note: *#1 Roto Lock Female (on Backbox)*	1	*355-5006-02*
	Item 27 is secured by: #10-24 X 1-3/4" Carriage Bolt Sq. Neck (Qty. 2) (231-5022-00) **and** #10-24 Nylon Stop Nut (Qty. 2) (240-5206-00)		
28	Hex Key Allen Wrench 5/16"	1	777-0001-00
29	Black Leg & Leveler Assembly	4	500-5921-50
	Item 29 is secured by: Leg Bolt Back Plate (535-5703-00) **and** Leg Bolt 3/8" X 16 X 2-1/2" Hex 5/8" Hd. (2/per) (231-5001-01) *To order just a Leg Leveler (3/8" - 16 X 3") use SPI Nº: 500-5017-00. A Leg "without" a Leg Leveler is not available.*		
30	Black Plastic Back Panel Shield	1	545-5928-00
	Item 30 is secured by: #6 X 1/2" PPH A Black (Qty. 3) (237-5805-00)		

Cabinet & Playfield - Switches





Take Note:

* An asterisk (*) indicates items are not noted in the pictorial.

1. For switches used corresponding to the Switch Matrix Grid of this game, see Section 3, Chapter 2, ...Diagnostics.
2. For location of the Cabinet Switches, see the previous page.
3. **See Appendix I for color choices, drawings and explanation on Normal & Rear mounted Modular Stand-Up Targets.**
4. **Legend Note:** Items noted with a white square ❒ are mounted above the playfield; items noted with a black square ■ are mounted below the playfield or on/in the cabinet.

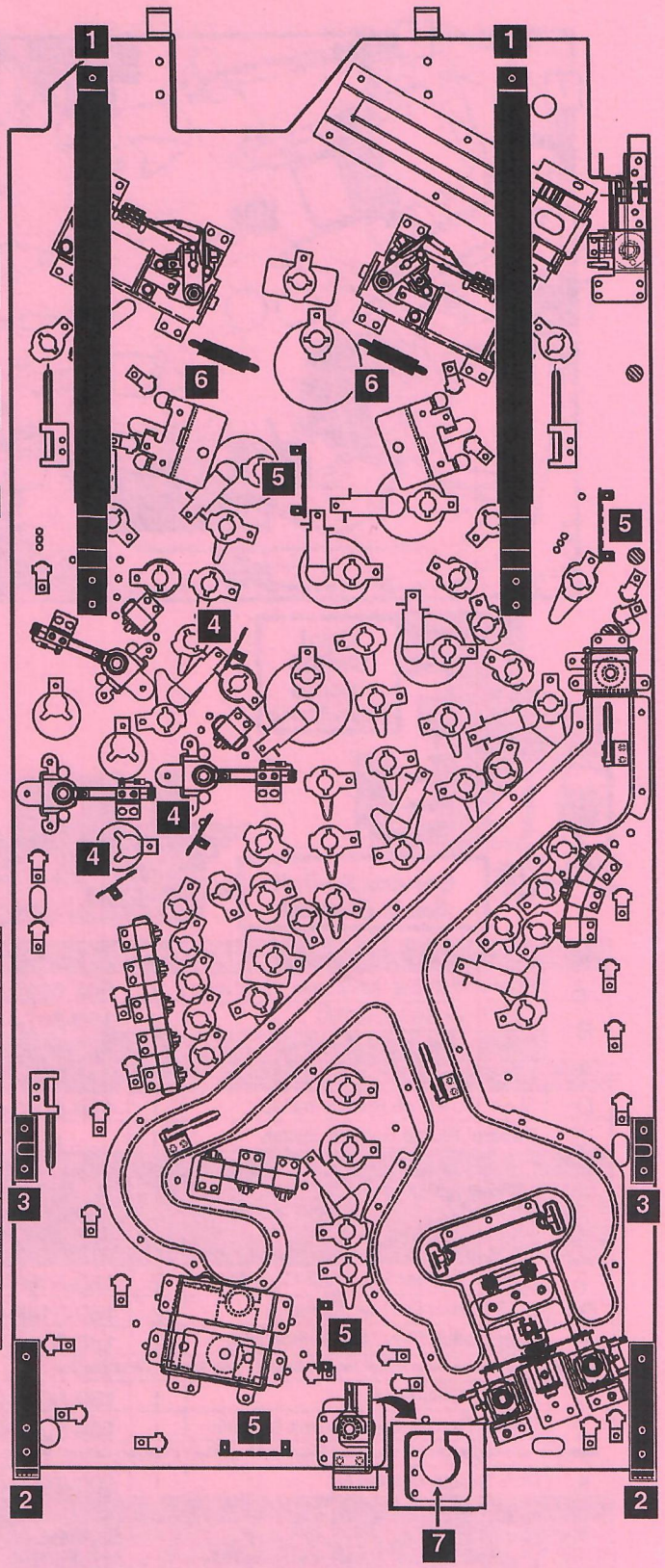
Nº	Cabinet Switch Name	QTY.	Part Nº
A	Start Button Sw. Assy. (Red "Flipper" Style)	1	500-6090-02
B*	Coin Door Switch (USA)	4	180-5024-00
	Coin Door Switch (¥ Japan)	n/a	180-5091-00
C	Large Round Auto Launch Assy.	0	Not Used
D*	Slam Tilt Switch (On Coin Door)	1	180-5022-00
E	Cabinet Plumb Bob Tilt Switch	1	n/a
ORDER ONLY INDIVIDUAL PARTS NEEDED (NO ASSY. NUMBER):			
E1	Tilt Hanger Bracket	1	535-5221-00
E2	Tilt Hanger Wire (Attached to bracket)	1	535-5319-00
E3	Tilt Contact Wire	1	535-7563-01
E4	Tilt Plumb Bob (Atch'd to hanger wire)	1	535-5029-00
F	Flipper Cabinet Sw. - Self-Cleaning	2	180-5160-00
G*	EOS Switch (on Lwr. Flippers)	2	180-5149-00
H	Diagnostics Service Switches (X3)	1	180-5012-03
Item H is secured to Diagnostics Switch Bracket (535-6860-01) on Coin Door.			
I	Service Outlet - US	1	180-5008-01
J	On/Off Rocker Sw. (Arcolectric C1350AB)	1	180-5001-01
Item J is secured to On/Off Sw. Mounting Bracket (535-8318-00) on Cabinet Bottom.			
K	Dual Switch Assembly	1	500-5808-00
ORDERING ABOVE (ITEM K) ASSEMBLY PART Nº WILL INCLUDE:			
K1*	Mounting Bracket	1	535-6958-00
K2	**Playfield Power Interlock Sw. (Top)**	1	**180-5136-00**
K3	**Memory Protect Switch (Bottom)**	1	**180-5000-00**
Item K is secured to Cabinet by: #8 X 1/2" HWH AB (Zinc) Blue (Qty. 2) (234-5101-05)			

SEE ABOVE PARTIAL CABINET DRAWING (H & K) AND PREVIOUS PAGE FOR CABINET SWITCH A-K LOCATIONS.

Nº	Playfield Switch Name	QTY.	Part Nº
1A	Dual OPTO TRANS Board	1	520-5173-00
	Dual OPTO REC Board		520-5174-00
1B	Long Hop OPTO TRANS Board	1	520-5082-00
	Long Hop OPTO REC Board		520-5083-01
2	Shooter Lane Switch Assembly	1	500-6096-00
ORDERING ABOVE (ITEM 2) ASSEMBLY PART Nº WILL INCLUDE:			
2A*	**Micro Switch**	1	**180-5157-00**
2B*	Switch Mounting Bracket	1	535-6173-00
2C*	#2-56 X 3/8" HWH MS (Ser) TF 3/16" Hd.	2	237-5938-01
2D*	Diode, 1N4001	1	112-5001-00
Item 2 is secured by: #6 X 1/2" HWH AB (Zinc) Red (Qty. 2) (234-5001-02)			
3A	P/F R/O Micro Sw. Assy. (Lt. Mount)	0	500-6227-01
3B	P/F R/O Micro Sw. Assy. (Rt. Mount)	5	500-6227-02
Item 3B is secured by: #8 X 1/2" HWH AB (Zinc) Blue (Qty. 2/per) (234-5101-05)			
4	Micro Switch (Roller Actuator, Lite-Force)	4	180-5119-02
5	Turbo Bumper Switch	3	180-5015-03
6	Slingshot Stack (Blade) Switch	4	180-5054-00
7	Micro Switch (on Roll-Under Gates)	2	180-5087-00
8	Micro Switch (on Super VUK)	1	180-5052-00
9	Micro Switch (on VUK, "Y" Actuator)	1	180-5116-01
10	Micro Switch (High Form, on Under-Trough)	3	180-5057-00
11	Modular S-U Target Narrow (Green)	1	500-6138-04
11R	Mod. S-U Target Nar. Rear Mnt. (Green)	1	500-6138-04R
12	Modular S-U Target Rectangle (Red)	1	500-6228-02
13R	Mod. S-U Trgt. Rnd. Rear Mnt. (Flo-Grn)	3	500-6075-11R
14	Modular S-U Target Square (Flo-Green)	2	500-6139-11
14R	Mod. S-U Target Sq. Rear Mnt. (Purple)	5	500-6139-09R
Items 11-14 are secured by: #8 X 3/4" HWH AB (Zinc) (Qty. 2/per) (234-5103-00)			

Playfield - General Parts (Below)

Nº	Below Playfield Part Name	QTY.	SPI Part Nº
1	Playfield Support Slide Bracket	2	535-6862-02
	Item 1 is secured by: #8 X 1/2" HWH AB (Zinc) Blue (Qty. 2/per) (234-5101-05) **and** #8-32 X 5/8" HWH Swage (Serr) Zinc (Qty. 1/per) (237-5975-03)		
2	Edge Slide Bracket	2	535-5988-00
	Item 2 is secured by: #4 X 1/2" PFH (Zinc) (Qty. 3/per) (237-5840-00)		
3	Pivot Pin Bracket Welded Assembly	2	500-5329-00
	Item 3 is secured by: #8-32 X 5/8" HWH Swage (Serr) Zinc (Qty. 2/per) (237-5975-03)		
4	Diode Terminal Strip 3-Lug (813) Isolated	3	055-5204-03
5	Diode Terminal Strip 4-Lug (821) Isolated	4	055-5204-04
	Items 4 & 5 are secured by: #6 X 3/8 HWH AB Zinc (Qty. 1/per) (234-5000-00). ***NOTE:*** *1N4001 Diodes (112-5001-00) are for Switches and/or Lamps. See Section 5, Chapter 2, Playfield Diode Terminal Strip Locations for Diode Usage & Wire Colors.*		
6	3A 250v Slo-Blo Fuse	2	200-5000-08
	Fuse Clip Holder (Socket)		205-5000-01
	Item 6, Fuse Clip Holder (Socket) 205-5000-01 is part of a set of 12 (205-5000-12). You can order them as individuals (...-01) or a set of 12 (...-12). **Items 6 is secured by:** #6 X 1/2" PPH AB (Qty. 1/per) (237-5805-00)		
7	Wood VUK Spacer	1	525-5548-00



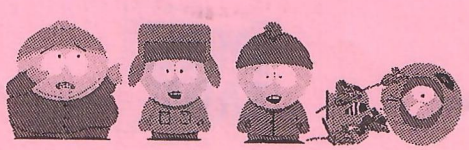
Nº	Miscellaneous Part Name	QTY.	SPI Part Nº
n/a *	3½" Plastic Post (holds cables)	9	545-5253-01
n/a *	Screw Down Cable Tie	4	040-5005-00
n/a *	4" Cable Tie PLT1MXMR	230	040-5001-01
n/a *	5½" Cable Tie PLT1.5I	15	040-5001-02
n/a *	5½" Cable Tie PLT1.5M-XMR	142	040-5001-06
n/a *	Insulating Tubing #18 (Teflon) (12" Long)	1	605-5003-00
n/a *	Heat Shrink Tubing ⅛" ø (BLK) (12" Lg.)	2	605-5002-00
n/a *	Heat Shrink Tubing ⅛" ø PUI-24 (12" Lg.)	1	605-5006-00
n/a *	Heat Shrink Tubing ¼" ø (CLR) (12" Lg.)	3	605-5004-00
n/a *	Heat Shrink Tubing ¼" ø (BLK) (12" Lg.)	0	605-5004-01
n/a *	Split Flex Tubing 1¼" ø (12" Long)	2	605-5008-00
n/a *	Split Flex Tubing ¼" ø (12" Long)	5	605-5008-01
n/a *	Split Flex Tubing ½" ø (12" Long)	1	605-5008-02

Tubular Note: *Tubing is sold by the foot. The quantity shown is a multiple of that amount to cover lengths under 12" in this game. (e.g. a qty. of 6 means there is 5 feet plus up to 11" of tubing.).*

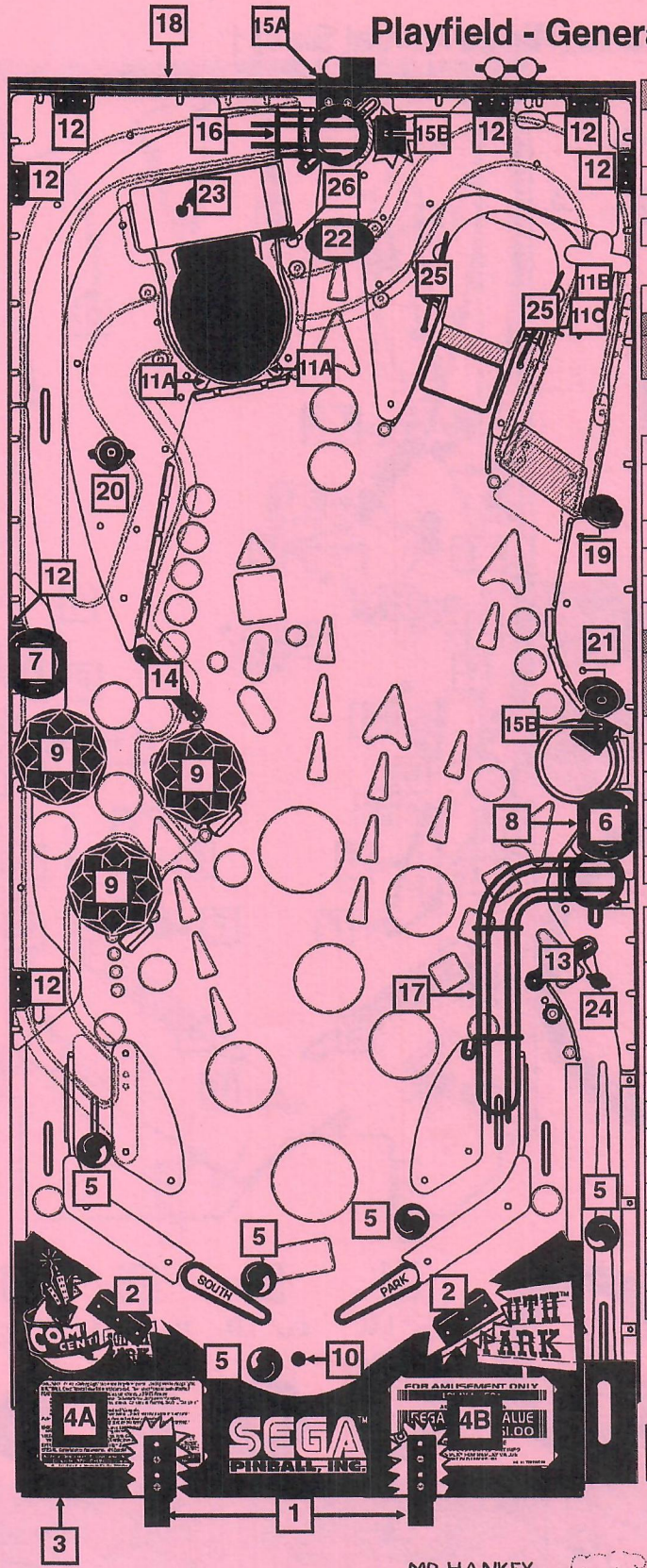
Take Note:

* An asterisk (*) indicates items are not shown on this page.

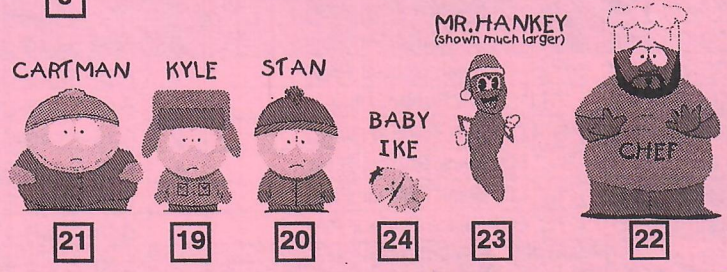
1. For Sockets & Bulbs (drawings & part numbers) see Pgs. 60-62.
2. For Major Assemblies, Ramps and/or Under Troughs, see the Blue Pages, Sec. 2, Chp. 2
3. For Switches see the previous page.
4. *Tubing is used to insulate various cables/lugs. Tubing can only be ordered in 12" increments. Cut the amount required for each application. Cut sizes are variable in length. The quantities reflect total lengths required for entire game (averaged up to nearest foot). Quantities may change during production.*
3. **Legend Note:** Items noted with a black square ■ are mounted below the playfield.



Playfield - General Parts (Above)



№	Above Playfield (P/F) Name	QTY.	SPI Part №
n/a *	P/F Screened w/ Inserts & **NO** Parts	1	830-5100-71
	P/F Complete w/ Inserts & **ALL** Parts		505-6004-71-71
1	Playfield Hanger Bracket	2	535-8385-00
	Item 1 is secured by: #8-32 X 7/8" HWH MS Zinc (Qty. 2/per) (237-5890-00)		
2	Arch Retaining (Hold-Down) Brackets	2	535-8394-00
	Item 2 is secured to the playfield by: #8 X 1/2" HWH AB (Zinc) Blue (Qty. 3/per) (234-5101-05)		
3	Arch Assembly (Metal)	1	500-6005-01
	ORDERING ABOVE (ITEM 3) ASSEMBLY PART № WILL INCLUDE:		
	3A* Arch (Plain Black Metal) without Fork	1	535-8392-01
	3B* Nelson Protect Strip 8-9/16"	2	545-5212-02
	Item 3 is secured to the playfield by: #10-32 X 5/16" PH FL U/C MS STL Zinc (Qty. 2) (237-6013-00)		
	(Note: Decals are not included with the above. See Playfield - Plastic, Decals & Mylar.)		
4A	Instruction Card - South Park	1	755-5171-00
4B	Coin Card (50¢-1)	1	755-5087-50
	Coin Card (50¢-1 75¢-1/2 $1-3)		755-5087-00
5	1-1/16" Steel Balls	5	260-5000-00
6	Mini-Mars Light Cover Snap-In (Red)	1	550-5030-02
7	Mini-Mars Light Cover Snap-In (Yellow)	1	550-5030-06
8®	Riveted Plastic Piece (Buty.) Assy.	1	515-7009-14-71
	ORDERING ABOVE ® RIVETED ASSY. PART № WILL INCLUDE:		
	8A Screened (Red) Plastic Piece -14	1	830-5967-14
	8B* 2-Lug Stand-Up Short Socket	1	077-5101-00
	8C* Rivet, 1/8" ø X 3/16" Long	1	249-5001-00
9	Pop Bumper Cap Red	3	550-5057-02
10	Plug-Cap (3/16") Black Plastic	1	545-5232-01
11A	Rubber Lite Cover GREEN	2	545-5014-04
11B	Rubber Lite Cover YELLOW	1	545-5014-06
11C	Rubber Lite Cover ORANGE	1	545-5014-07
12	Ramp Mounting Welded Bracket	7	515-6508-00
	Item 12 is secured to the Rails by: #6 X 3/4" HWH AB (Zinc) (Qty. 2/per) (234-5003-00)		
13	1-Way Gate Mounting Bracket (Sm.)	1	535-5269-03
	Wire Gate (for above)		535-5307-03
14	1-Way Gate Mounting Bracket (Lg.)	1	535-5269-06
	Wire Gate (for above)		535-5307-09
15A	Snubber Brkt. (Ball Stop) Weldment	1	515-6973-00
15B	Snubber Bracket (Ball Stop) Standard	2	535-8250-01
16	Wire Ramp (Top VUK)	1	515-6971-00
17	Wire Ramp (Bottom SVUK)	1	515-6972-00
18	Black Wood Back Panel (w/Inserts)	1	525-5550-00
19	South Park Kyle (Small Figurine)	1	880-5025-00
20	South Park Stan (Small Figurine)	1	880-5026-00
21	South Park Cartman (Small Figurine)	1	880-5027-00
22	South Park Chef (Small Figurine)	1	880-5028-00
23	South Park Mr. Hankey (Sm. Figurine)	1	880-5029-00
24	South Park Baby Ike (Small Figurine)	1	880-5030-00
	Items 19 & 21 are supported by: 2" .045ø Music Wire (Qty. 1/per) (265-5058-00); **Item 20 is supported by:** 1" .039ø Music Wire (Qty. 1) (265-5058-01) **Item 24 is supported by:** 2" .030ø Music Wire (Qty. 1) (265-5058-02). **Items 19, 20, 21 & 24 require:** Clear Plstc. Wshr. .19 X .63 X .03 (Qty. 2/per) (545-6502-00) **Items 19, 20, 21 & 24 are secured by:** #6 X 3/4" HWH AB (Zinc) (Qty. 1/per) (234-5003-00) *For securing hardware for Items 22 & 23 see the Blue Pages for the Assy. its associated with.*		
25	Trap Spring (Prevent Ball Traps)	2	265-5051-00
26	Clear Bumper Dot (Self-Adhesive)	1	280-5012-00



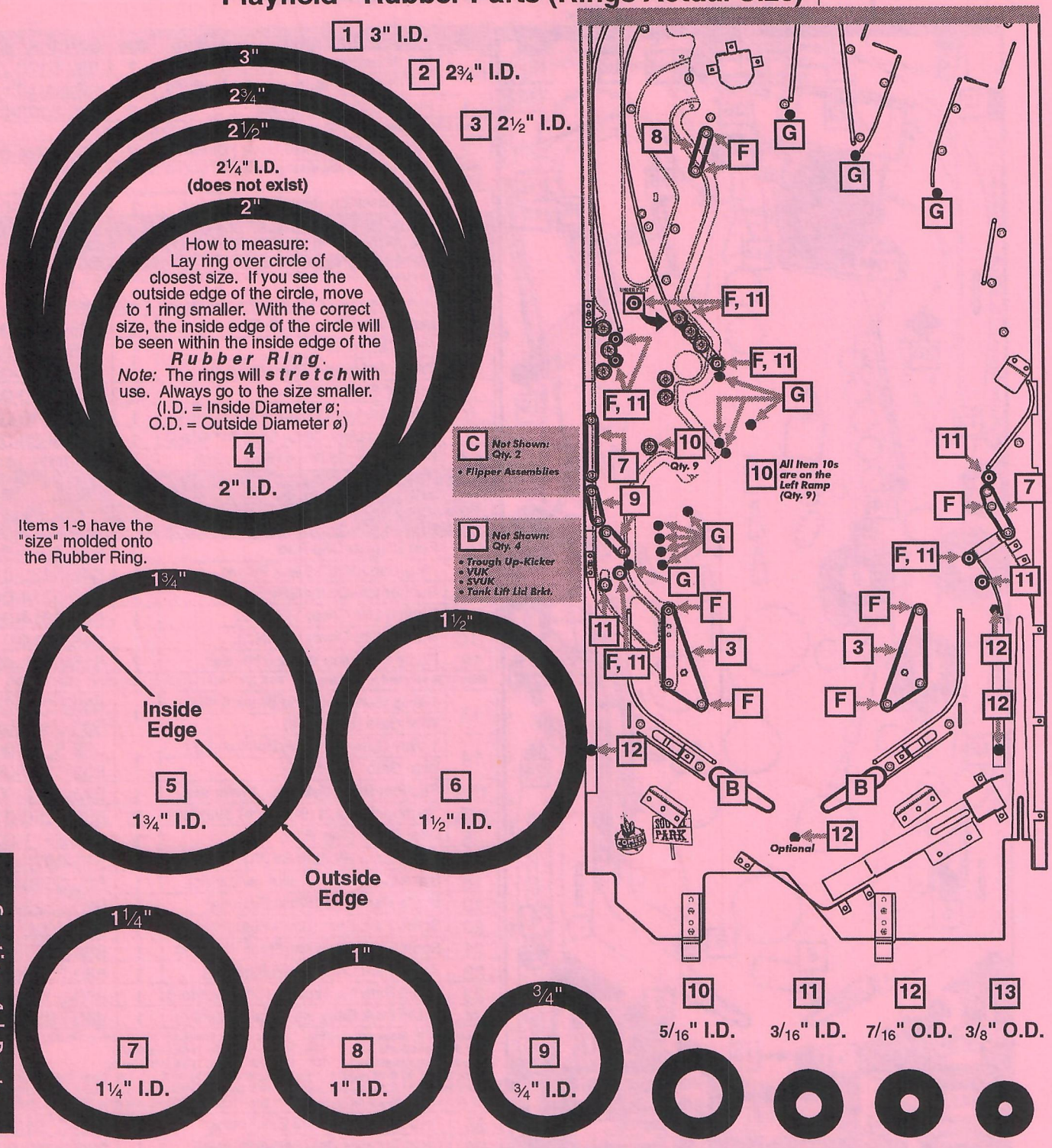
Take Note:

* An asterisk (*) indicates items are not noted in the pictorial.

® "R" indicates item has a riveted-on part(s), if removing/adding rivets is not an option, order the entire ® Sub-Assembly. ***Please Note:*** If the ® Sub-Assembly **is not** available, call Tech. Support.

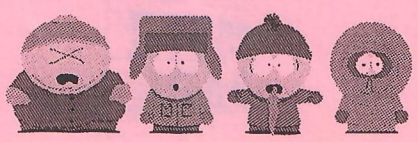
1. Some unique parts *may be included with* **or** *associated with* a Major Assembly or Ramp Assembly; **see the Blue Pages** for parts required not appearing on this page.
   If you still cannot find the part required, call Sega Pinball Technical Support, 1-800-542-5377.
2. **Legend Note:** Items noted with a white square ❒ are mounted above the playfield.

Playfield - Rubber Parts (Rings Actual Size) †

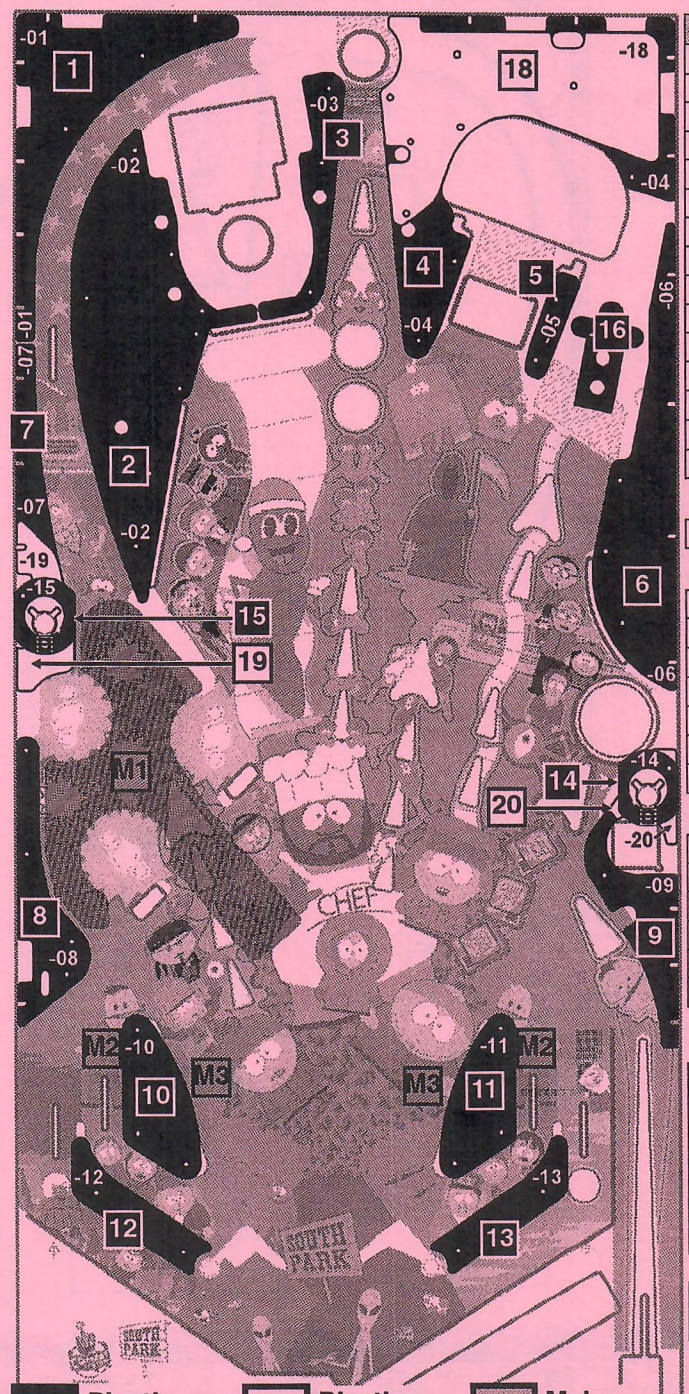


Section 4 | Parts

№	Rubber Part Name	QTY.	Part №	№	Rubber Part Name	QTY.	Part №
A	Small Flipper Rubber Ring	0	545-5207-00	4	2" I.D. Black Rubber Ring	0	545-5348-08
B	Large Flipper Black Rubber Ring	2	545-5277-00	5	1¾" I.D. Black Rubber Ring	0	545-5348-21
C*	Rubber Deflector Pad (Bumper)	2	545-5428-00	6	1½" I.D. Black Rubber Ring	0	545-5348-07
D*	Rubber Bumper (Grommet)	4	545-5105-00	7	1¼" I.D. Black Rubber Ring	2	545-5348-06
E	Bumper Post Rubber	0	545-5009-00	8	1" I.D. Black Rubber Ring	1	545-5348-05
F	Post Rubber (Sleeve Short)	13	545-5151-00	9	¾" I.D. Black Rubber Ring	2	545-5348-04
G	Post Black Rubber (Sleeve Tall)	13	545-5308-00	10	5/16" I.D. Black Rubber Ring	9	545-5348-02
1	3" I.D. BLK Rubber Ring	0	545-5348-10	11	3/16" I.D. Black Rubber Ring	9	545-5348-01
2	2¾" I.D. Black Rubber Ring	0	545-5348-20	12	7/16" O.D. Black Rubber Ring	4	545-5348-17
3	2½" I.D. Black Rubber Ring	2	545-5348-09	13	3/8" O.D. Black Rubber Ring	0	545-5348-19



Playfield - Plastic (Butyrate), Decals and Mylar



№	Plastic (ButYrate) Name	QTY.	SPI Part №
*Note: Some pieces are © clear **OR** ® rivited.*			830-5967-XX
1	Top Left Corner (Screened)	1	830-5967-01
2	Left of Toilet (Screened)	1	830-5967-02
3	Right of Toilet (Screened)	1	830-5967-03
4	Top Right Corner (Screened)	1	830-5967-04
5	To Kenny Assy. Rt. Side (Screened)	1	830-5967-05
6	Right Side Playfield (Screened)	1	830-5967-06
7	Left Side Playfield (Screened)	1	830-5967-07
8	Lower Lt. Side Playfield (Screened)	1	830-5967-08
9	Lower Rt. Side Playfield (Screened)	1	830-5967-09
10	Left Slingshot (Screened)	1	830-5967-10
11	Right Slingshot (Screened)	1	830-5967-11
12	Left Return / Outlane (Screened)	1	830-5967-12
13	Right Return / Outlane (Screened)	1	830-5967-13
14®	Right Side Flash (Solid Yellow)	1	830-5967-14
Item 14 has a socket ® riveted to it. If you need this Item 14 with the socket already riveted, see **Sec. 4, Chp. 2, ...Major Assemblies & Ramps, Page 76 (Item A.P. 5).**			
15®	Left Side Flash (Solid Red)	1	830-5967-15
Item 15 has a socket ® riveted to it. If you need this Item 15 with the socket already riveted, see **Playfield - General Parts (Above), Page 53 (Item 8).**			
16	Ramp Sign [Mr. Hankey] (Screened)	1	830-5967-16
17*	Alternate Ramp Sign [Kenny] (Scrnd.)	1	830-5967-17
18©	Upper Right Corner (Clear) over -04	1	830-5967-18
19©	Left Side Playfield (Clear) over -07	1	830-5967-19
20©	Lwr. Rt. Side Playfield (Clear) over -09	1	830-5967-20
21	Back Panel Cover (Screened)	1	830-5967-21
22®	Backbox Marquee Sign (Screened)	1	830-5967-22
Item 22 has two (2) brackets ® riveted to it. If you need this Item 22 with the brackets already riveted, see **Backbox (Showcase II) Assy., Page 48 (Item 27).**			
23*	Key Fob (Kenny, Screened)	1	830-5967-23
24*	Key Fob (Mr. Hankey, Screened)	1	830-5967-24
25*	Key Fob (Stan, Screened)	1	830-5967-25
26*	Key Fob (Kyle, Screened)	1	830-5967-26
27*	Key Fob (Cartman, Screened)	1	830-5967-27
28*	Key Fob (Chef, Screened)	1	830-5967-28

№	Mylar Name	QTY.	SPI Part №
M1	Clear Mylar - Pop Bumper Area	1	820-5876-00
M2	Clear Mylar Square - Return Lane Ball Drop	2	820-5815-00
M3	Clear Mylar - In front of Slingshots	2	820-5821-00
M4*	Black Mylar - Cover Discs (in Cab. hiding bolts)	2	820-5041-00

№	Game #60 Decal Name	SPI Part №
D1*	#71 Screened Decal Sheet	820-6244-XX

Note: View the last 2-Digit № on decal (if applicable) for the desired individual replacement. (***Individual pieces may not be available**, in which case the entire sheet must be ordered.*)
-01 Arch Left (Hold Flipper...); **-02** Arch Right (Pull Plunger...); **-03** Arch Center (Howdy Ho!...) **-04** Arch Over Plunger; **-05** Coin Door (Sega Pinball, Inc.); **-06** Install 5 Balls; **-07** Portals...; **-08** Rt. Fipper Bat (Park); **-09** Lt. Flipper Bat (South); **-10** Left Ramp Top Cover; **-11** Ramp (Under Chef, Todays Hot Lunch...); **-12, -13, -14** Pop Bumper Caps (Yellow/Red Circles all identical); **-20** Mr. Hankey Ramp Entrance;
5-Bank S-U Targets (by Plastic Item 2): **-21** Grandpa; **-22** Cartman's Mom; **-23** Mayor; **-24** Ofc. Barbrady; **-25** Starvin' Marvin;
Stand-Up Targets by Pop Bumpers: **-26** Ned; **-27** Mephesto;
3-Bank S-U Targets (by Plastic Item 6): -28 Wendy; **-29** Mr. Garrison; **-30** Mr. Macky;
3-Bank S-U Targets (front of Toilet): **-32** Wreath; **-31** Toilet Paper; **-33** Xmas Bulbs;
Not on Game~In Parts Bag: **-15** Kenny; **-16** Kyle ; **-17** Stan; **-18** Cartman; **-19** Arch Center Mr. Hankey Cover-Up (if desired); **-34** Chef; **-35** Playfield Mr. Hankey Cover-Up (if desired).

D2*	So. Park Diode Terminal Strip Desc. Decal	820-6221-71
D3*	Game Specific Backbox Fuse Locations	820-6152-71

№	Generic Decal Names		SPI Part №
Power (820-6223-00)		Protective Earth (820-6224-00)	
Generic Backbox Fuse Loc. (820-6152-00)		Fuse Lable (UL) (820-6143-00)	
UL Listing LabeL (820-6141-00)		Danger Coin Door (UL) (820-6140-00)	
Power Box Decal - USA (820-6123-01)		Power Box Decal" Supp. (820-6123-04)	
High Voltage Label (UL) (820-6082-01)		Suitable ...Use... (UL) (820-6001-01)	

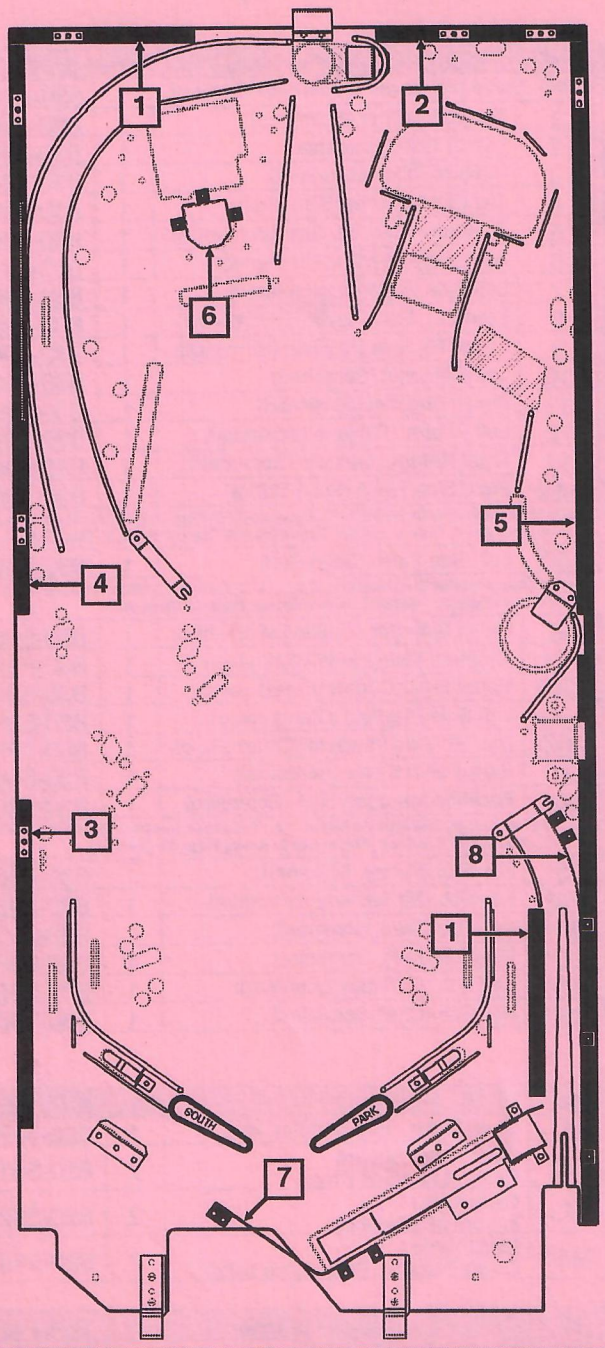
Take Note:

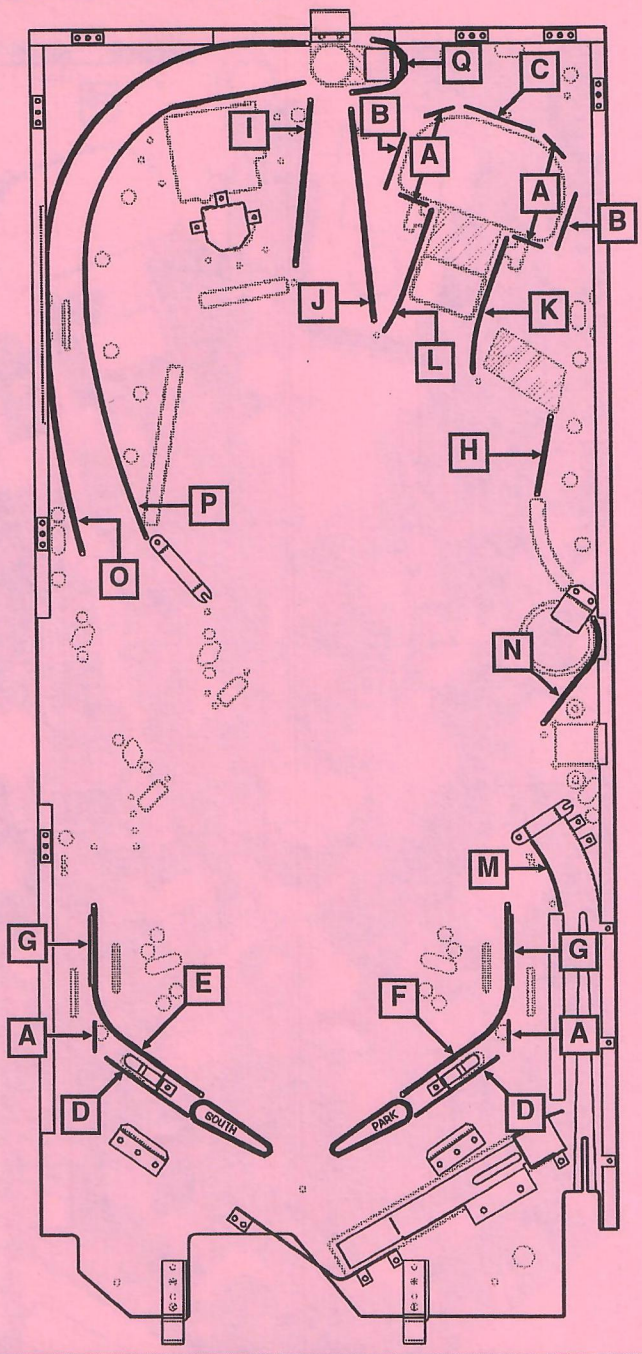
* An asterisk (*) indicates items are not noted in the pictorial.

® "R" indicates item has a riveted-on part(s), if removing/adding rivets is not an option, order the entire ® Sub-Assembly.

1. To order the entire Decal or Plastic (Screened or Clear) sheets, use the Part № with the "-XX" ending. For individual pieces replace the "-XX" with appropriate last 2-Digit №.
   Attention: Individual pieces may not be available.
2. **Legend Note:** Items noted with a black square ■ are Screened; ...a white square ❒ are © Clear; ...a gray square ▒ are Mylar.

Playfield - Rails and Ball Guides †





№	Wood & Metal Rail (MR) Name	QTY.	SPI Part №
1	Wood Rail - 6-1/2"	2	525-5007-14
2	Wood Rail - 7-3/8"	1	525-5007-40
3	Wood Rail - 11-1/2"	1	525-5007-27
4	Wood Rail (Upper Left Side Playfield)	1	525-5549-00
5	Wood Rail (Right Side Playfield)	1	525-5547-00

Items 1-5 are secured by: #6 X 1-1/4" PFH A (Zinc) (Qty. 18) (237-5804-00)

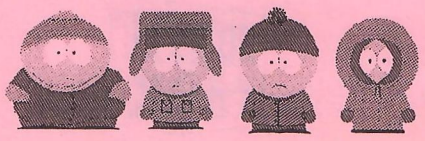
6	Metal Rail Weldment (Toilet Drain)	1	515-6998-00
7	Metal Rail (Center Drain under Arch)	1	535-8393-00
8	Metal Rail (Shooter Lane Rt. Side)	1	535-8513-00

Items 6-8 are secured by: #8 X 1/2" HWH AB Zinc (Blue) (Qty. 12) (234-5101-05)

№	Wire Form (WF) Name	QTY.	SPI Part №
A	Wire Form - 1"	6	535-5300-05
B	Wire Form - 2"	2	535-5300-10
C	Wire Form - 2-1/2"	1	535-5300-01
D	Wire Form - 3-1/2"	2	535-5300-03

№	Ball Guide Rail (BGR) Name	QTY.	SPI Part №
E	Ball Guide Rail (Left Return Lane)	1	535-7560-00
F	Ball Guide Rail (Right Return Lane)	1	535-7560-01
G	Ball Guide Rail (Outlane Fence)	2	535-7595-00
H	Ball Guide Rail - 2-3/4"	1	535-6492-02
I	Ball Guide Rail - 5-3/4"	1	535-6492-12
J	Ball Guide Rail - 7-3/8"	1	535-6492-07
K	Ball Guide Rail (Kenny Right)	1	535-8514-01
L	Ball Guide Rail (Kenny Left)	1	535-8515-01
M	Ball Guide Rail (Shooter Lane Left)	1	535-8516-00
N	Ball Guide Rail (Large Hole Cartman)	1	535-8517-00
O	Ball Guide Rail (Left Orbit, Outer)	1	535-8518-00
P	Ball Guide Rail (Left Orbit, Inner)	1	535-8519-00
Q	Ball Guide Rail (Top VUK)	1	535-8520-00

† Items with Ø Qty. are not used in this game. Size and/or quantities may change during production.

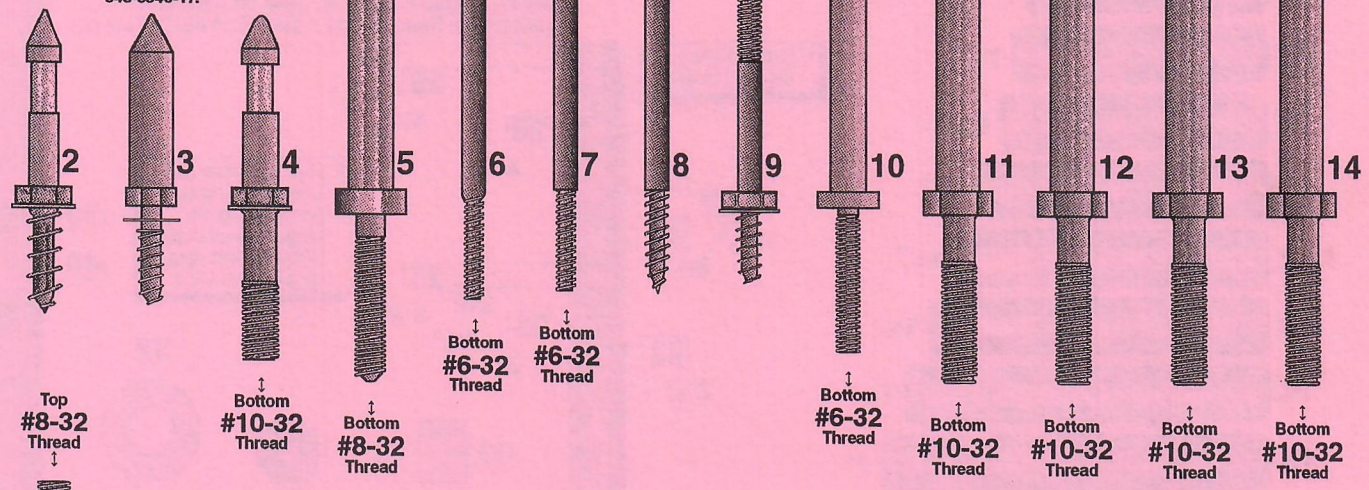


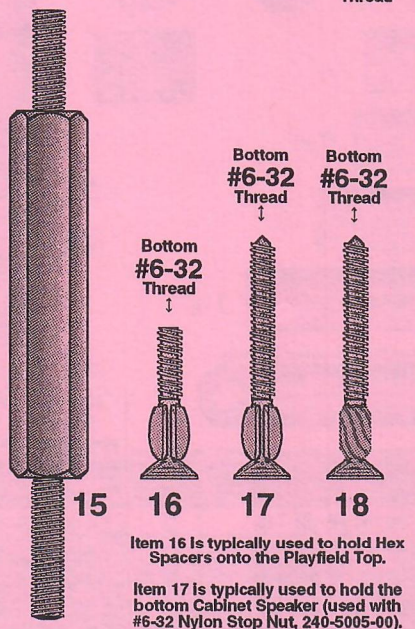
Playfield - Metal Posts (Screws) and Nuts (Actual Size) †

1

Item 1 Post can use 3/16" I.D. Rubber Ring, 545-5348-01; or if Item 1 Post is used in pairs, can use 3/4" — 3" Rubber Rings.

Items 2 & 4 Posts can use 7/16" O.D. Rubber Ring, 545-5348-17.





Item 16 is typically used to hold Hex Spacers onto the Playfield Top.

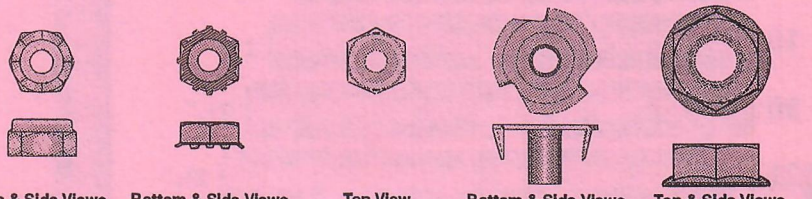
Item 17 is typically used to hold the bottom Cabinet Speaker (used with #6-32 Nylon Stop Nut, 240-5005-00).

Item 18 is typically used to hold Item 15 (515-5939-00) in Turbo Bumper Assy., 515-6459-04.

Note: The "Fins" keep the screw from turning inside the wood hole.

† Items with Ø Qty. are not used in this game. Size and/or quantities may change during production.

Nut Note: All nuts shown with a " ✔ " are used in this game. The quantities (not specified) vary. The remaining items listed are not used in this game and are noted for reference only (used in prior games).



Shown Below~ • #6-32 Nylon Stop Nut: 240-5005-00 ✔

Top & Side Views

Nylon Stop Nuts *Not Shown:*

- #6-32 (w/ 1/4" Hex Body): 240-5010-00
- #8-32: 240-5102-00 ✔
- #10-32: 240-5203-00 ✔
- #10-24: 240-5206-00 ✔
- #4-40: 240-5303-00 ✔
- #4-40 (18/8 Stainless): 240-5303-01
- 5/16"-18: 240-5316-00

Shown Below~ • #6-32 KEPS Nut (with Star Washer): 240-5008-00 ✔

Bottom & Side Views

KEPS Nuts *Not Shown:*

- #6-32 (w/ 1/4" Hex Body): 240-5011-00
- #8-32: 240-5104-00
- #10-32: 240-5208-00 ✔
- #10-24: 240-5207-00 ✔
- #4-40: 240-5318-00

Shown Below~ • #6-32 Hex Nut (No Star Washer): 240-5004-00 ✔

Top View

Hex Nuts *Not Shown:*

- #8-32: 240-5103-00
- #10-32: 240-5201-00
- #10-24: 240-5202-00 ✔
- #10-32 X 3/8": 240-5209-00 ✔
- 3/4-16: 240-5315-00
- #2-56: 240-5301-00
- 7/8"-14: 240-5317-00

Shown Below~ • #6-32 T-Nut: 240-5002-00 ✔

Bottom & Side Views

T-Nuts *Not Shown:*

- #6-32 (w/Side Cut Off): 240-5002-01
- #8-32: 240-5101-00 ✔
- #10-32 (Black Oxide): 240-5007-00
- #10-32 (w/Side Cut Off): 240-5205-00
- #10-24: 240-5200-00

Shown Below~ • 1/4" X 20 Flange Nut: 240-5300-00 ✔

Top & Side Views

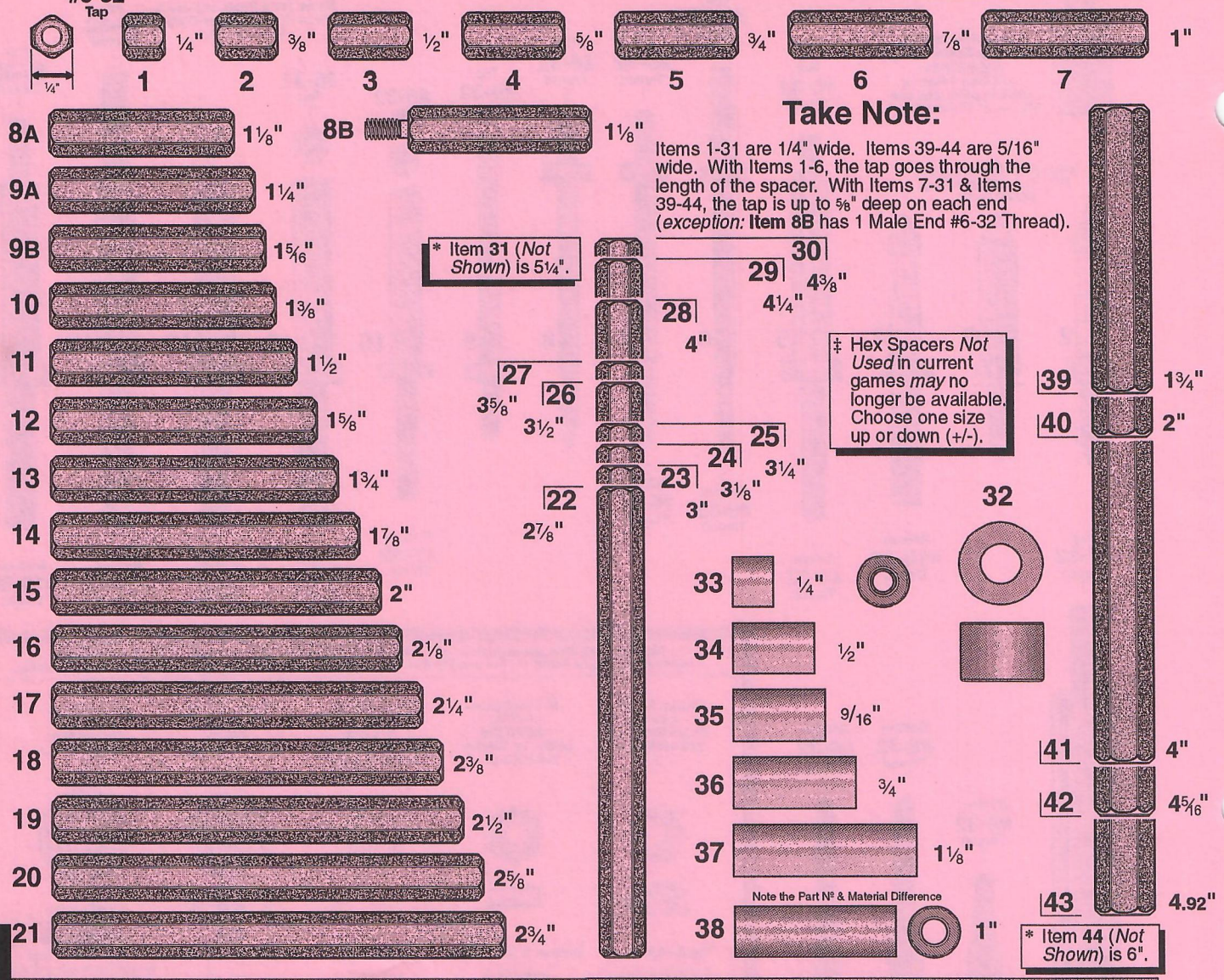
Miscellaneous Nuts *Not Shown:*

- *Plastic Pal Nut (on Flipper Buttons): 240-5003-00*
- Metal Pal Nut (on Flipper Buttons): 240-5003-01 ✔
- #6-32 Wing Nut: 240-5001-00
- #8-32 Wing Nut: 240-5100-00
- 1/4"-20 Wing Nut: 240-5302-00
- 1/4"-20 Toggle Wing: 240-5324-00 ✔

№	Metal Post Name	QTY.	SPI Part №	№	Metal Post Name	QTY.	SPI Part №
1	Stand-Off Double Groove Post 1-1/16"	0	530-5102-01	10	Post #6-32 Tap / #6-32 Bottom	0	530-5127-00
2	Mini-Post Wood Screw	6	530-5004-00	11	Post Hex Base #6-32 Tap/#10-32 Bot.	0	530-5332-01
3	Mini-Post Wood Screw (no cut-away)	0	530-5004-01	12	Post Hex Base (No Tap)/#10-32 Bot.	14	530-5332-00
4	Mini-Post Mach. Screw / #10-32 Bot.	1	530-5005-00	13	Post Hex Base #8-32 Top/#10-32 Bot.	0	530-5332-02
5	Post Fasten #6-32 Top / #8-32 Bot.	0	530-5007-00	14	Post Hex Base #6-32 Top/#10-32 Bot.	0	530-5332-03
6	Post Fasten #8-32 Top / #6-32 Bot.	3	530-5008-00	15	Playfield Support #8-32 Top/Bottom	0	530-5285-00
7	Post Fasten #6-32 Top / #6-32 Bot.	21	530-5012-02	16	#6-32 X 3/4" Fin Shank Screw	8	237-5921-02
8	Post Fstn. #6-32 Top / Wood Scr. Bot.	24	530-5010-02	17	#6-32 X 1-1/4" Fin Shank Screw	4	237-5883-00
9	Post #6-32 Top / Wood Screw Bottom	0	530-5263-01	18	#6-32 X 1-3/16" Spirol Fin Shank Scr.	9	237-5957-00

Playfield - Metal Spacers (Actual Size) †

A ***Standard USA 9 Inch Ruler*** is provided on the back cover.



Take Note:

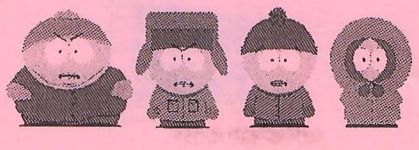
Items 1-31 are 1/4" wide. Items 39-44 are 5/16" wide. With Items 1-6, the tap goes through the length of the spacer. With Items 7-31 & Items 39-44, the tap is up to 5/8" deep on each end (*exception:* **Item 8B** has 1 Male End #6-32 Thread).

‡ Hex Spacers *Not Used* in current games *may* no longer be available. Choose one size up or down (+/-).

Section 4 | Parts

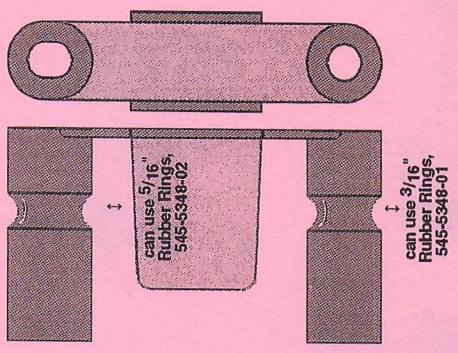
Nº	Metal Spacer Name	QTY.	SPI Part Nº	Nº	Metal Spacer Name	QTY.	SPI Part Nº
1	1/4" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-00	22	2 7/8" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-31
2	3/8" X 1/4" Hex Spacer #6-32 Tap	1	254-5008-12	23	3" X 1/4" Hex Spacer #6-32 Tap	2	254-5008-14
3	1/2" X 1/4" Hex Spacer #6-32 Tap	7	254-5008-03	24	3 1/8" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-19
4	5/8" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-02	25	3 1/4" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-26
5	3/4" X 1/4" Hex Spacer #6-32 Tap	2	254-5008-04	26	3 1/2" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-27
6	7/8" X 1/4" Hex Spacer #6-32 Tap	5	254-5008-05	27	3 5/8" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-25
7	1" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-06	28	4" X 1/4" Hex Spacer #6-32 Tap	5	254-5008-21
8A	1 1/8" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-17	29	4 1/4" X 1/4" Hex Spacer #6-32 Tap	3	254-5008-30
8B	Same as 8A with Male End #6-32	0	254-5024-17	30	4 3/8" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-29
9A	1 1/4" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-11	31 *	5 1/4" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-35
9B	1 5/16" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-34	32	3/8" X 1/2" Spacer (Used with Backbox)	2	530-5099-00
10 ‡	1 3/8" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-33	33	1/4" X 5/16" X .144" I.D. Spacer Tap.	1	254-5014-03
11	1 1/2" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-09	34	1/2" X 5/16" X .144" I.D. Spacer Tap.	3	254-5014-00
12 ‡	1 5/8" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-13	35	9/16" X 5/16" X .144" I.D. Spacer Tap.	0	254-5014-04
13	1 3/4" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-10	36	3/4" X 5/16" X .144" I.D. Spacer Tap.	0	254-5014-01
14 ‡	1 7/8" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-20	37	1 1/8" X 5/16" X .144" I.D. Spacer Tap.	0	254-5014-02
15	2" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-07	38	1" X 5/16" X .144" I.D. Spacer Tap.	0	254-5001-00
16	2 1/8" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-32	39	1 3/4" X 5/16" Hex Spacer #6-32 Tap	0	254-5018-06
17	2 1/4" X 1/4" Hex Spacer #6-32 Tap	3	254-5008-18	40	2" X 5/16" Hex Spacer #6-32 Tap	0	254-5018-06
18	2 3/8" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-28	41	4" X 5/16" Hex Spacer #6-32 Tap	0	254-5018-03
19	2 1/2" X 1/4" Hex Spacer #6-32 Tap	1	254-5008-16	42	4 5/16" X 5/16" Hex Spacer #6-32 Tap	0	254-5018-00
20	2 5/8" X 1/4" Hex Spacer #6-32 Tap	2	254-5008-08	43	4.92" X 5/16" Hex Spacer #6-32 Tap	0	254-5018-04
21	2 3/4" X 1/4" Hex Spacer #6-32 Tap	3	254-5008-15	44 *	6" X 5/16" Hex Spacer #6-32 Tap	0	254-5018-02

† Items with Ø Qty. are not used in this game. Size and/or quantities may change during production.

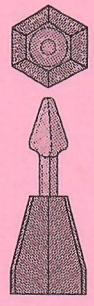


Playfield - Plastic Posts and Spacers (Actual Size) †

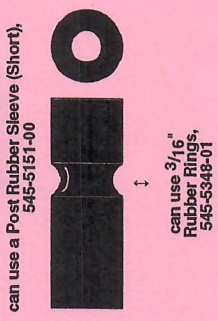
1** Various Colors



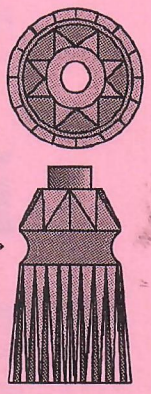
2** Various Colors



3** Limited Colors



4** Various Colors



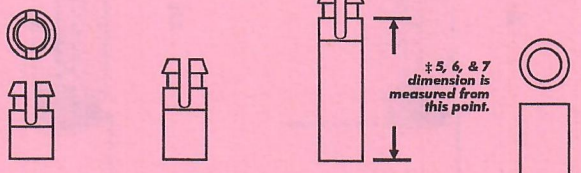
Items 3-4 Posts used in pairs can use ¾" through 3" Rubber Rings, (See Rubber Parts for Part Nºs).

Take Note:

PLASTIC PART COLOR CHART					
Nº	Color	Nº	Color	Nº	Color
-00	Black	-06	Yellow	-12	Fluor. Blue
-01	Clear	-07	Orange	-13	Teal Green
-02	Red	-08	White	-14	Gray
-03	Amber	-09	Purple	-15	Luminescent
-04	Green	-10	Fluor. Orange	-16	Gold
-05	Blue	-11	Fluor. Green		

** Items 1, 2 and 4 come in various colors (may not be available in every color). Item 3 is currently only available in the color stated in this game manual (other colors used in prior games may no longer be available). The "-XX" in Part Nºs which may come in various colors should be replaced with the desired 2-Digit Nº. corresponding to the color desired. *Some colors may no longer be available for desired item.*

5 ‡ 6 ‡ 7 ‡ 8



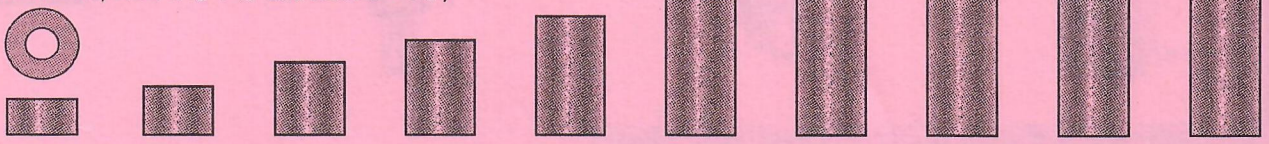
¼" ⅜" ¾" ½"

‡ Items 5, 6 & 7 (Board Spacers) dimensions are measured from bottom to just under cut-away (see pictorial with Item 7 above).

9 10 11 12 13 14 15 16 17 18

Take Note:

If any one of Items 9-18 Spacers is not available in the size required, order the smaller sized spacers required to stack sizes together until appropriate size is achieved. (e.g. If 1⅛" is needed but unavailable, order a ½" + ⅝" and stack to = 1⅛")



3/16" ¼" ⅜" ½" ⅝" ¾" 1" 1⅛" 1¼" 1½"

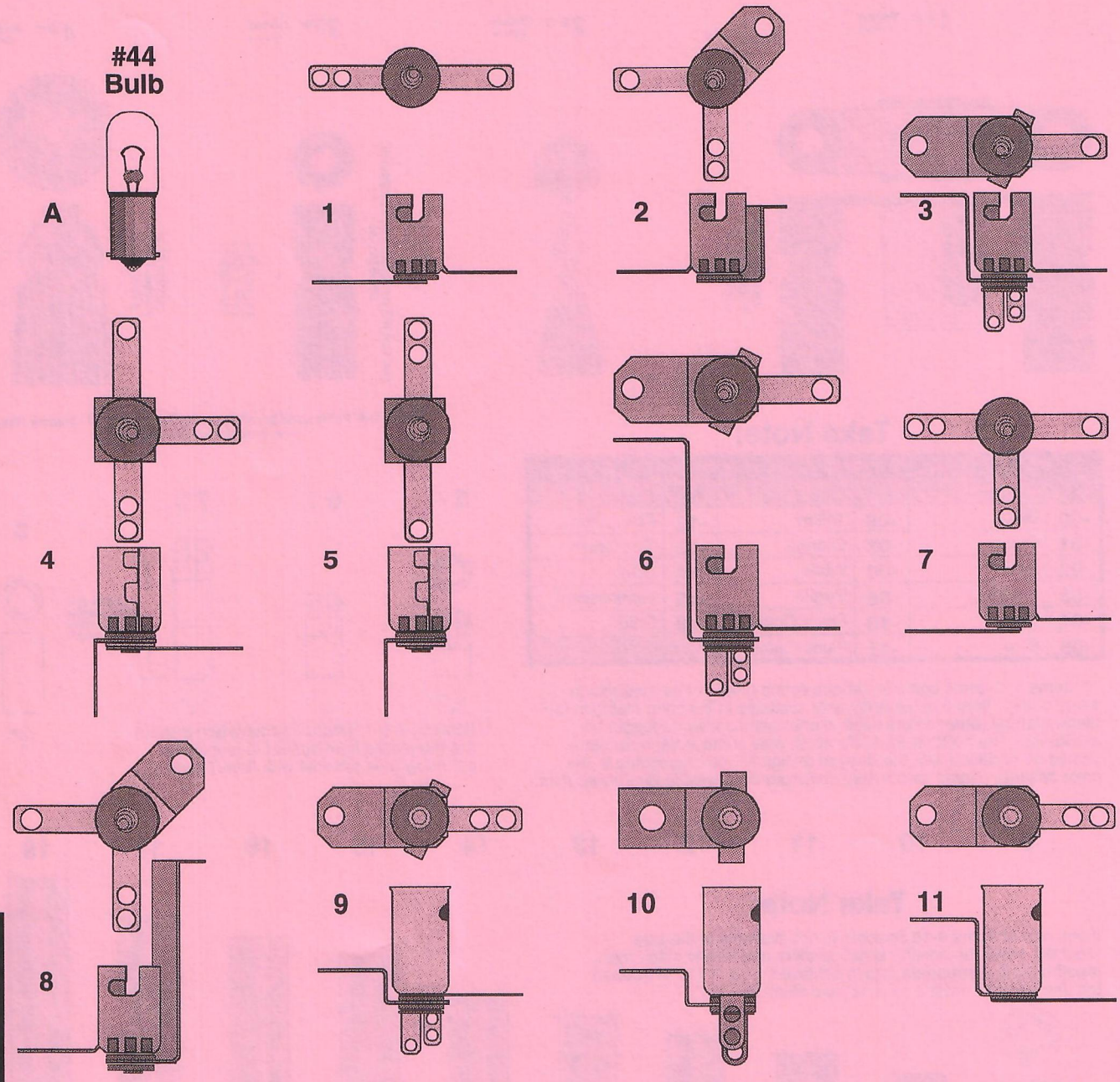
Nº	Plastic Post/Spacer Name	QTY.	SPI Part Nº
1**	Top Lane Mini-Light Hood	0	550-5061-XX
	Item 1 typically secured by: #6-32 X 1-3/4" PPH MS (Zinc) (Qty. 2/per) (237-5511-00) **and** Washer 9/64" X 5/16" OD X 1/32" (Qty. 2/per) (242-5017-00)		
2**	Mini-Jewel Post	0	550-5052-XX
	Item 2 typically secured by: #6 X 3/8" HWH AB (Zinc) (Qty. 1/per) (234-5000-00)		
3**	1 1/16" Single Groove Post (Black)	60	550-5059-00
4**	*Single* Groove Jewel Post (Clear)	9	550-5034-01
	Items 3 & 4 typically secured by: Post Fastening Screw #6-32 Top / #6-32 Bottom (Qty. 1/per) (530-5012-02, Item 7 Page 63) ***and may use*** Washer 9/64" X 5/16" OD X 1/32" (Qty. 1/per) (242-5017-00) **with a** #6-32 Nylon Stop Nut (Qty. 1/per) (240-5005-00).		
5 ‡	¼" Slf. Rtn. Spacer White	0	254-5007-02
6 ‡	⅜" Slf. Rtn. Spacer White	0	254-5007-01
7 ‡	¾" Slf. Rtn. Spacer White	0	254-5007-03
8	½" X ¼" Spacer White (Narrow)	0	254-5000-03

Nº	Plastic Post/Spacer Name	QTY.	SPI Part Nº
9	3/16" X ⅜" Spacer Gray (4 for Dot Display)	4	254-5000-18
10	¼" X ⅜" Spacer Gray	1	254-5000-02
11	⅜" X ⅜" Spacer Gray	0	254-5000-12
12	½" X ⅜" Spacer Gray	1	254-5000-01
13	⅝" X ⅜" Spacer Gray	0	254-5000-14
14	¾" X ⅜" Spacer Gray	2	254-5000-07
15	1" X ⅜" Spacer Gray	1	254-5000-04
16	1⅛" X ⅜" Spacer Gray	0	254-5000-06
17	1¼" X ⅜" Spacer Gray	0	254-5000-05
18	1½" X ⅜" Spacer Gray	0	254-5000-08

Items 10-19 typically secured by: See Items 6, 7 & 8 Page 57 **&/or** #6-32 1¾" PPH MS Zinc Screw (Qty. 1/per) (237-5511-00) **and** #6-32 Nylon Stop Nut (Qty. 1/per) (240-5005-00).

† Items with Ø Qty. are not used in this game. Size and/or quantities may change during production.

Playfield - Small Bayonet Type Bulbs and Sockets (Actual Size) †



№	#44 Bulb & Socket Name	QTY.	SPI Part №
A	#44 Bulb	33	165-5000-44
1	2-Lug Staple Down Socket	0	077-5000-00
2	2-Lug Stand-Up Short Socket	0	077-5002-00
3	3-Lug Stand-Up Short Socket	0	077-5008-00
4	3-Lug Laydown Socket	0	077-5006-00
5	2-Lug Laydown Socket	2	077-5003-00
6	3-Lug Stand-Up Long Socket	0	077-5009-00
7	3-Lug Staple Down Socket	0	077-5001-00
8	2-Lug Stand-Up Long Socket	0	077-5005-00
9	3-Lug Stand-Up Long Shell Socket	0	077-5013-00
10	2-Lug Stand-Up Lg. Shell Socket (GIs)	31	077-5031-00
11	1-Lug Stand-Up Long Shell Socket	0	077-5012-00

№	#455 Bulb	QTY.	SPI Part №
B	#455 Twinkle Bulb	0	165-5003-00

Take Note:

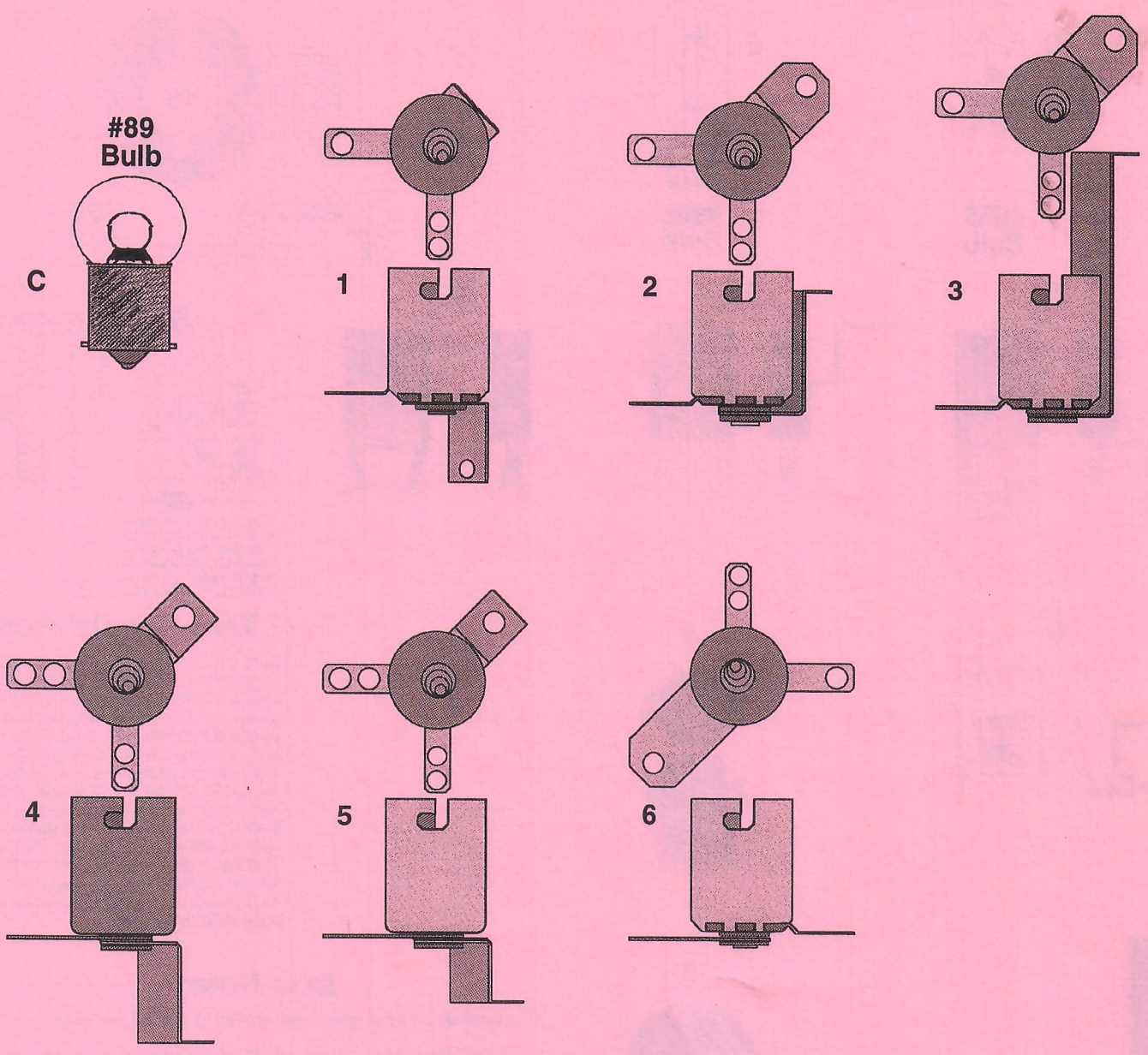
Item B Bulb (#455) is normally used in conjunction with Item 11 Socket, but ***can*** be used with Items 1-10 Sockets on this page.

#455 Bulb

B

† Items with Ø Qty. are not used in this game. Size and/or quantities may change during production.

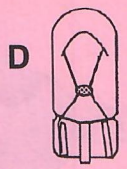
Playfield - Large Bayonet Type Bulb and Sockets (Actual Size) †



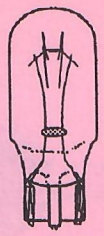
№	#89 Bulb & Socket Name	QTY.	SPI Part №
C	#89 Bulb	18	165-5000-89
1	Laydown Standard Socket	13	077-5100-00
2	2-Lug Stand-Up Short Socket	2	077-5101-00
3	2-Lug Stand-Up Long Socket	3	077-5102-00
4	Stand-Up Socket Rev. Short	0	077-5103-00
5	2-Lug Stand-Up Small Socket	0	077-5106-00
6	Straight Leg Socket	0	077-5107-00

† Items with Ø Qty. are not used in this game. Size and/or quantities may change during production.

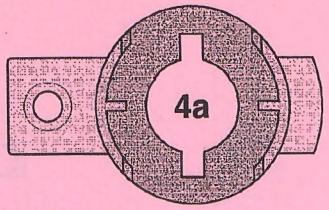
Playfield - Wedge Base Bulbs and Sockets (Actual Size) †

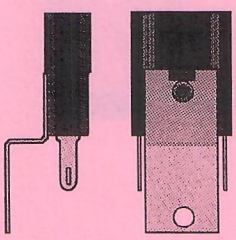


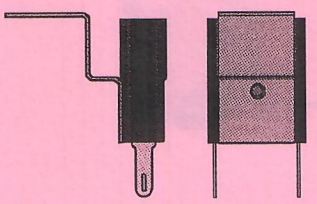
#555 Bulb

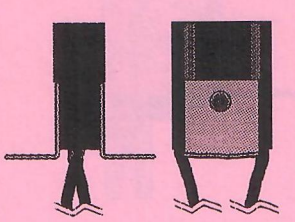


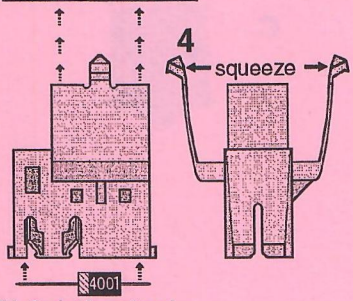
#906 Bulb



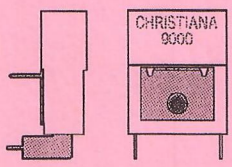






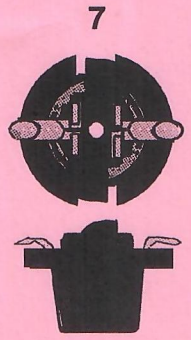


This Socket is equipped with a *built-in* Diode, 1N4003, (112-5013-00). However, replacement can be made with Diode, 1N4001, (112-5003-00).



↕ Take Special Note ↕

Item 4 is an Insulation Displacement Connection (IDC) Style Socket. This style is solderless, and has a built-in diode. This socket is secured to the playfield or comp- onent by Items 4a and 4b Snap-On Socket Brackets, or *may* also be snapped into Item 4c Socket Mounting Board where sockets are positioned too close together (clear plastic piece; if used in this game, Item 4c will show a Qty. and Part №.). Just squeeze the "side arms" of the socket together and pull away from the bracket or mounting board for easy Bulb replacement.



Take Note:

* An asterisk (*) indicates items are not shown on this page.

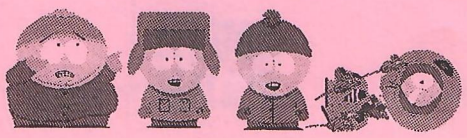
1. Item 2 Socket has 2 Wires attached are approximately 12" ea.
2. Item 5 Socket **was** used on PC Light Boards to position bulbs horizontally; Item 5 Socket is secured by soldering into place.
3. Item 6 Socket **was** used on PC Light Boards to position bulbs vertically; Item 6 Socket is secured by "twisting" into place.
4. Item E Bulb (#906) is normally used in conjunction with Item 7 Socket, but ***can*** be used with Items 1, 2, 4 or 5.

Note: Always replace with same type bulb in original application.

5. See the start of this chapter for Fluor. Bulb & Associated Parts.

№	#555 Bulb & Socket Name	QTY.	SPI Part №
D	#555 Wedge Base Bulb (Clear)	60	165-5002-00
1	Laydown #555 Wedge Base Socket	4	077-5026-01
2	#555 Wedge Base Offset Socket	4	077-5029-00
3	#555 W.B. Socket (for Pop Bumper)	3	077-5206-00
4	#555 IDC Snap-On Socket	52	077-5216-00
4a	5/16" Ht. Snap-On Socket Bracket	52	545-5760-18
4b *	19/32" Ht. Snap-On Socket Bracket	0	545-5760-19
4c *	Clear Plastic (Buty.) Socket Mtg. Bd.	0	Not Used
5	#555 W.B. Socket (Solder Type)	0	077-5207-00
6	#555 Wedge Base Socket (Twist)	0	077-5007-00

№	#906 Bulb & Socket Name	QTY.	SPI Part №
E	#906 Wedge Base Bulb (Clear)	1	165-5004-00
	#906 Wedge Base Bulb (Red)	2	165-5004-02
	#906 Wedge Base Bulb (Amber)	0	165-5004-03
	#906 Wedge Base Bulb (Blue)	0	165-5004-05
	#906 Wedge Base Bulb (Yellow)	0	165-5004-06
7	#906 Wedge Base Socket (Twist)	0	077-5016-00

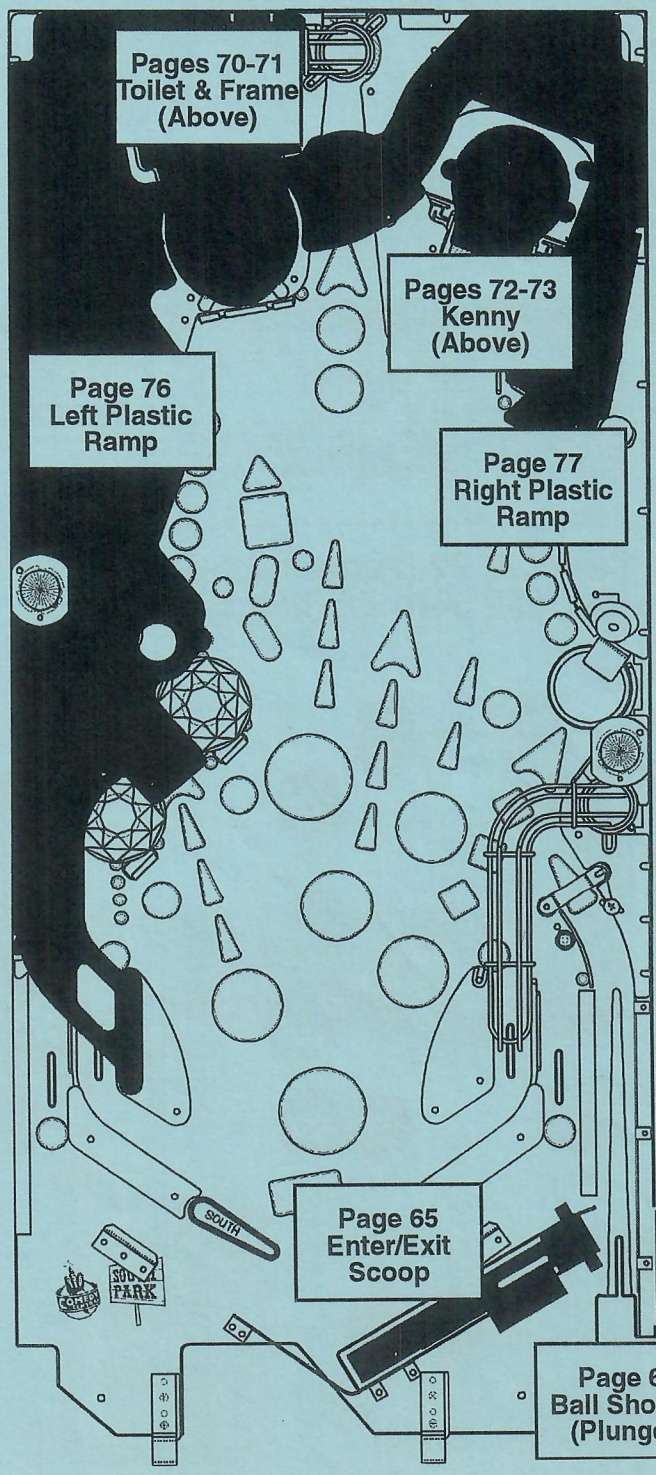


Drawings for Major Assemblies & Ramps (The Blue Pages)

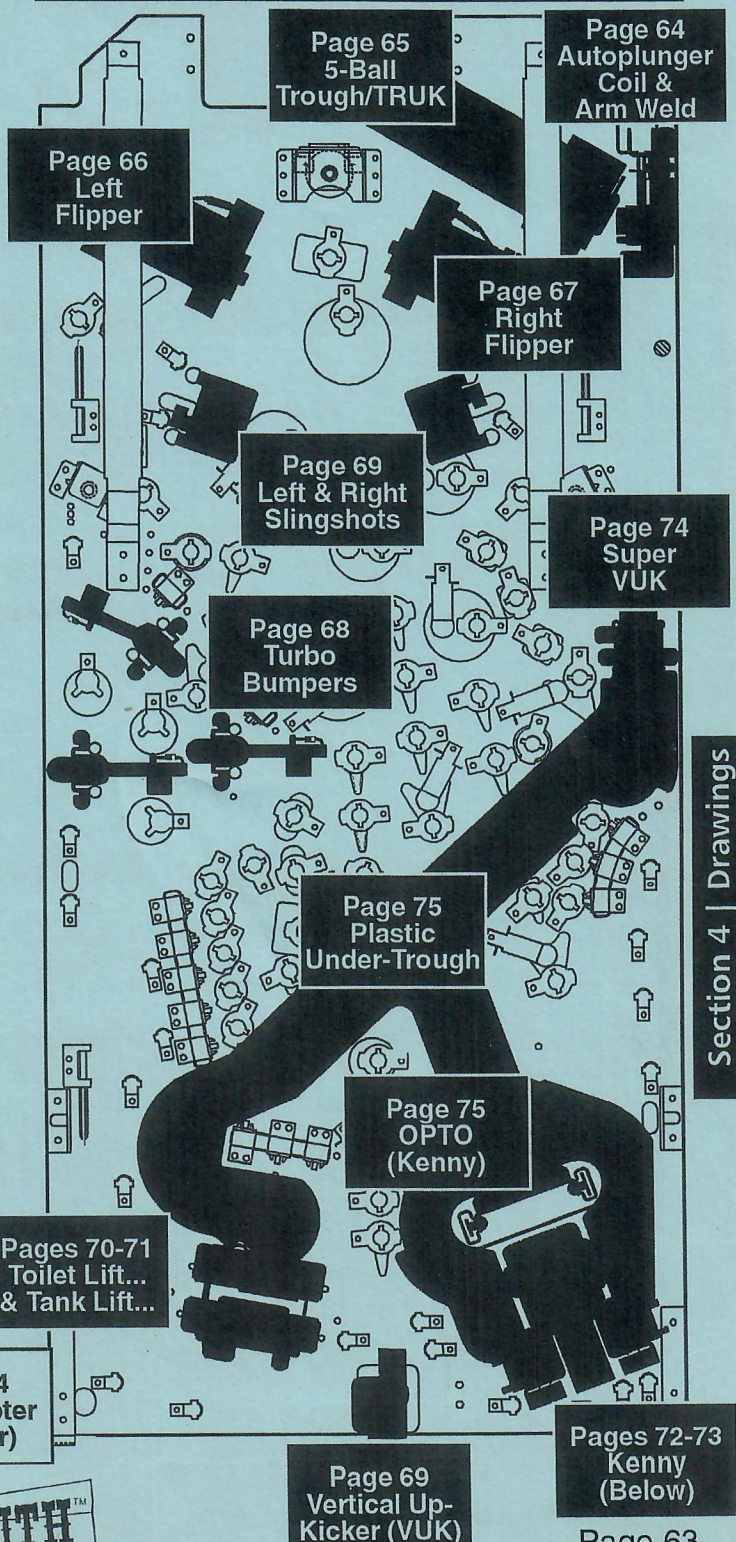
Overview

Drawings are provided for the Major Assemblies in this game with individual parts of each assembly numbered. Items noted with a white circle (①) are mounted above the playfield; items noted with a black circle (❶) are mounted below. All numbered parts describe the name, quantity & Part Nº. Associated Parts are noted and/or viewed with the associated Major Assembly. Parts not listed in this chapter are detailed in the Pink Pages, Chapter 1, Parts Identification & Location. Below are drawings of the Playfield (*Above & Below*) with the **Part Nº & Page Nº Highlighted**. ***Important:*** Read all "**Take Note:**" items.

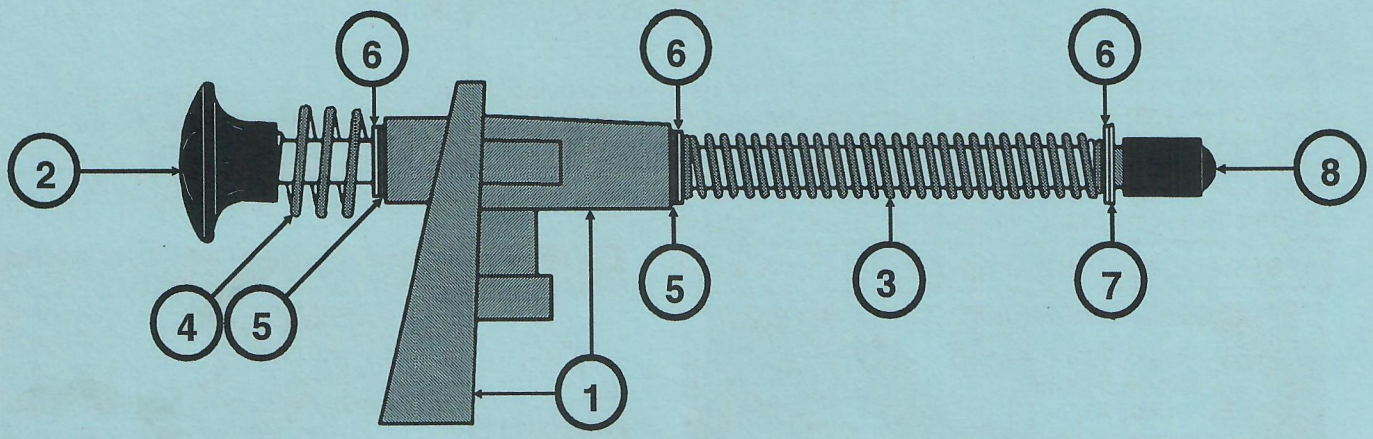
ASSEMBLIES MOUNTED ABOVE THE PLAYFIELD


Pages 70-71 Toilet & Frame (Above)
Pages 72-73 Kenny (Above)
Page 76 Left Plastic Ramp
Page 77 Right Plastic Ramp
Page 65 Enter/Exit Scoop
Page 64 Ball Shooter (Plunger)

ASSEMBLIES MOUNTED BELOW THE PLAYFIELD


Page 65 5-Ball Trough/TRUK
Page 64 Autoplunger Coil & Arm Weld
Page 66 Left Flipper
Page 67 Right Flipper
Page 69 Left & Right Slingshots
Page 74 Super VUK
Page 68 Turbo Bumpers
Page 75 Plastic Under-Trough
Page 75 OPTO (Kenny)
Pages 70-71 Toilet Lift... & Tank Lift...
Page 69 Vertical Up-Kicker (VUK)
Pages 72-73 Kenny (Below)

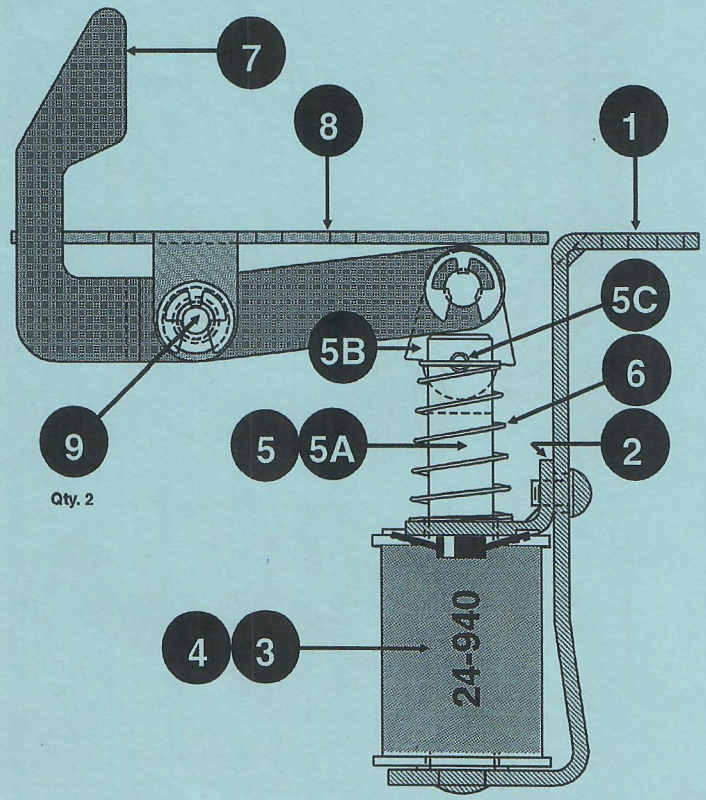
Ball Shooter (Plunger) Assembly, 500-6146-00-04 (Items 1-8)



Nº	Individual Part Name	QTY.	SPI Part Nº
1	Housing (Shooter Assembly)	1	535-5067-02
2	Rod Assembly (w/ Black Knob)	1	515-6557-00
3	Comp. Spring (Green, .035" ø)	1	266-5001-04
4	Compression Spring (Short Plunger)	1	266-5010-00
5	Bushing, 3/8" I.D. (Oilite)	2	280-5010-00
6	Washer, 3/8" I.D. X 5/8" O.D. X 1/16"	3	242-5014-00
7	Retaining Ring, 3/8" ø Shaft	1	270-5012-00
8	Plunger Tip (Black 50 Duro)	1	545-5276-00

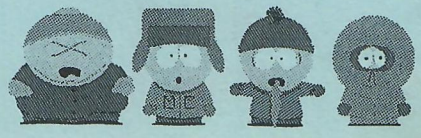
Ball Shooter (Plunger) Assembly, 500-6146-00-04, is secured to the Cabinet by: Support Plate (Qty. 1) (535-5027-00), #10-32 X 3/8 SHWH (Serr) Swage (Qty. 3) (237-5985-00) **and** #6 X 5/8" HWW AB (Zinc) (Qty. 2) (234-5002-00)

Autoplunger Coil Assembly, 500-6092-02 (Items 1-6) with Autoplunger Arm Weld Assembly, 500-6091-00 (Items 7-9)



Nº	Individual Part Name	QTY.	SPI Part Nº
Autoplunger Coil Assembly, 500-6092-02 (Items 1-6)			
1	Autoplunger Coil Bracket Assembly	1	515-6527-00
2	Coil Retainer Bracket	1	535-5203-03
Item 2 is secured to Item 1 by: #8-32 X 1/4" PPH MS (Sems) Zinc (Qty. 2) (232-5300-00)			
3	Coil, 24-940	1	090-5036-00T
ORDERING ABOVE (ITEM 3) COIL PART Nº WILL INCLUDE:			
—	Diode, 1N4004 (positioned at top)	1	112-5003-00
4	Coil Sleeve	1	545-5031-00
5	Plunger & Link Assembly	1	515-5338-00
ORDERING ABOVE (ITEM 5) SUB-ASSY. PART Nº WILL INCLUDE:			
5A	Plunger 2"	1	530-5025-01
5B	Plunger Link	1	545-5293-00
5C	Roll Pin, 1/8" ø X 5/8" Lg.	1	251-5008-00
Item 5B is secured to Item 7 by: Retaining Ring, 1/4" ø Shaft (Qty. 1) (270-5002-00)			
6	Compression Return Spring	1	266-5020-00
Autoplunger Arm Weld Assy., 500-6091-00 (Items 7-9)			
7	Arm Weld Assembly	1	515-6526-00
Item 7 is secured to Item 8 by: Retaining Ring, 1/4" ø Shaft (Qty. 1) (270-5002-00)			
8	Autoplunger Fulcrum	1	535-7697-00
9	Nyliner, 1/4" (Thomson #4l1-FF)	2	545-5423-00

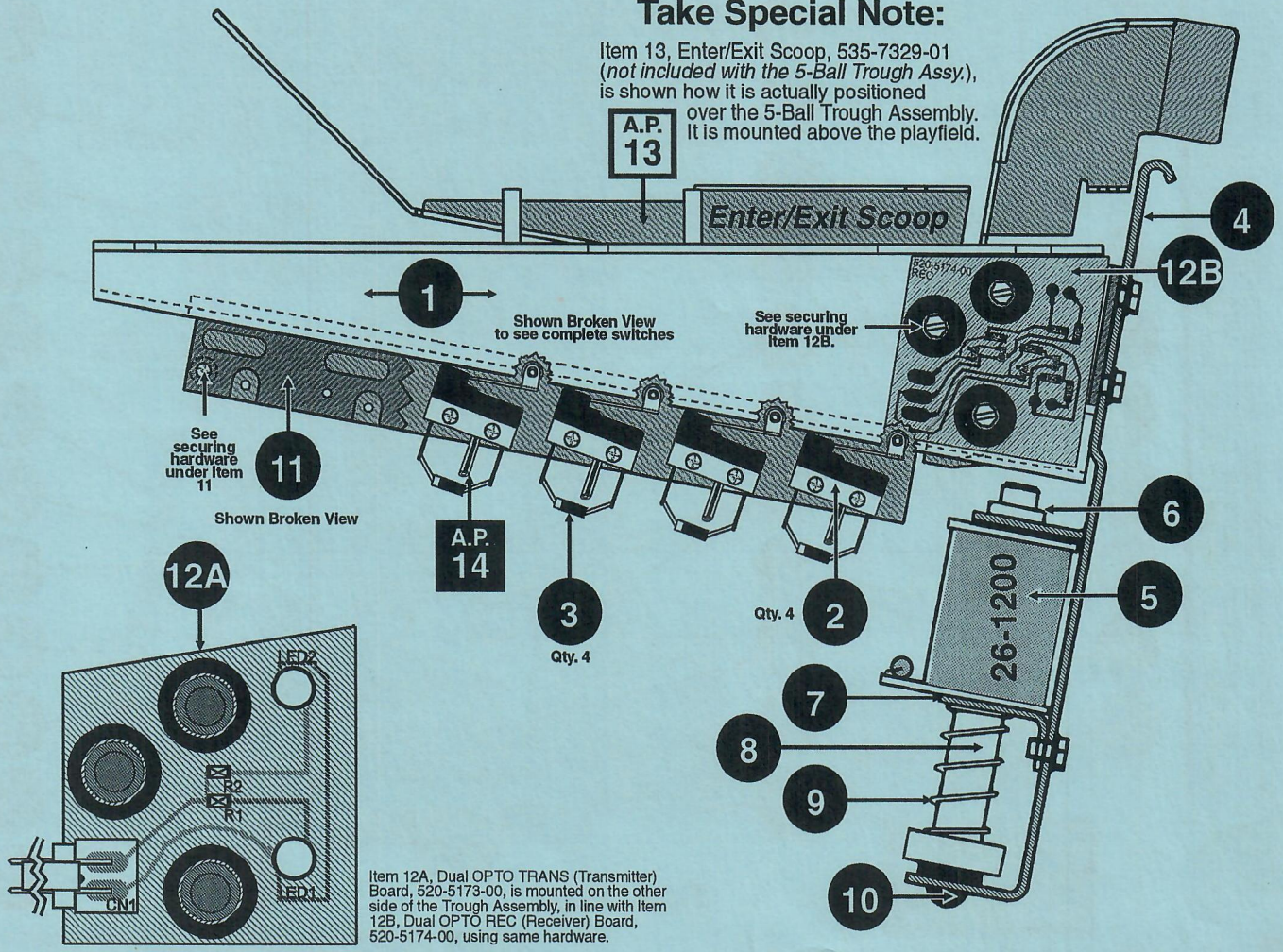
Autoplunger Arm Weld Assy., 500-6091-00 and Autoplunger Coil Assy., 500-6092-01 are secured under the playfield by: #8 X 1/2 HWH AB (Zinc) Blue (Qty. 9) (234-5101-05)



5-Ball Trough Assembly, 500-6318-25 (Items 1-12B)
and Associated Part: Ball Trough Enter/Exit Scoop, 535-7329-01 (Item 13)

Take Special Note:

Item 13, Enter/Exit Scoop, 535-7329-01 (*not included with the 5-Ball Trough Assy.*), is shown how it is actually positioned over the 5-Ball Trough Assembly. It is mounted above the playfield.



Item 12A, Dual OPTO TRANS (Transmitter) Board, 520-5173-00, is mounted on the other side of the Trough Assembly, in line with Item 12B, Dual OPTO REC (Receiver) Board, 520-5174-00, using same hardware.

Take Note:

* An asterisk (*) indicates item is *Not Shown* in pictorial.

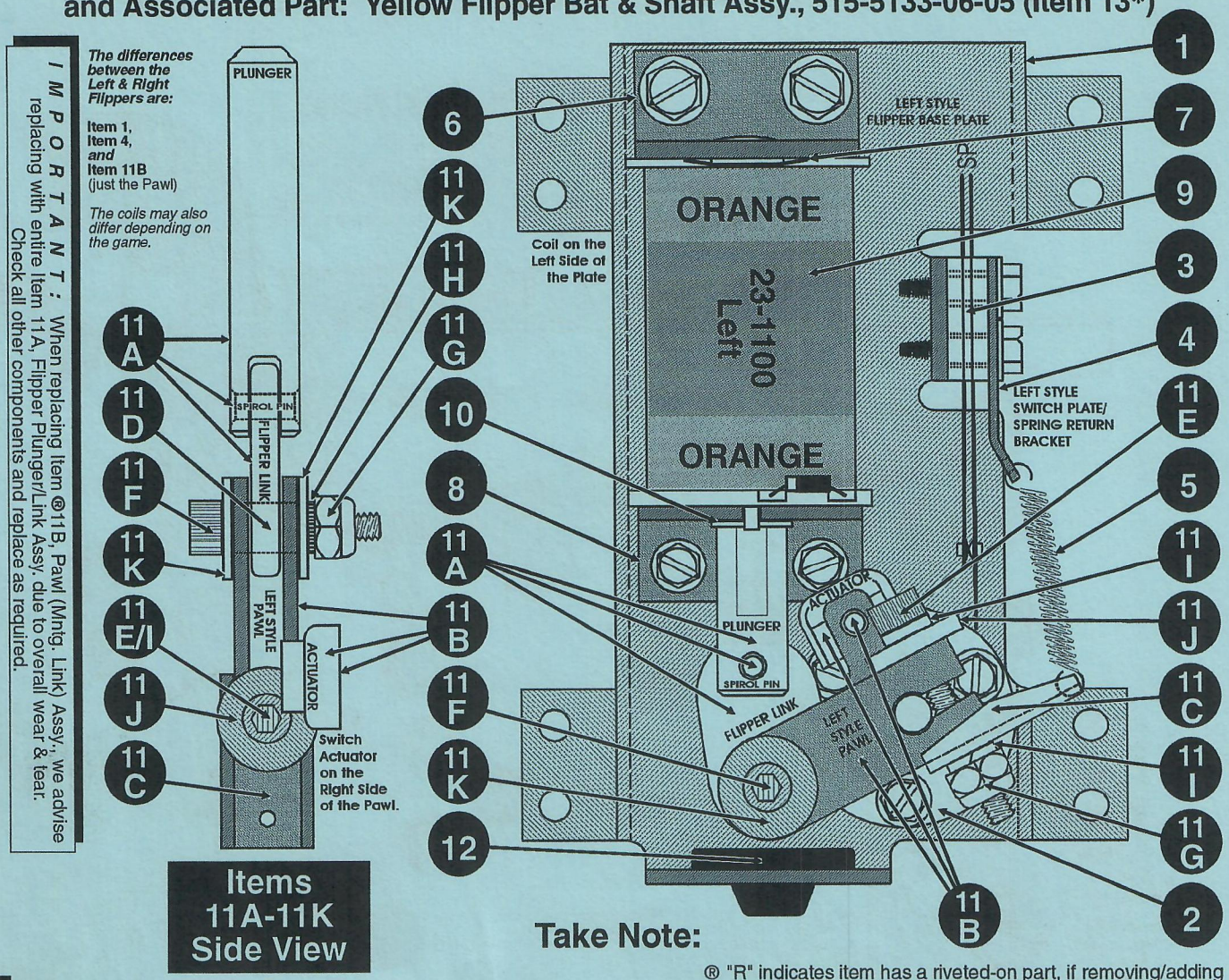
№	Individual Part Name	QTY.	SPI Part №
1	Ball Trough Outhole Mounting Bracket	1	515-6580-01
2	Micro-Switch (Roller Actuator, Lite-Force)	4	180-5119-02
	Item 2 is secured to Item 1 by: #2-56 X 1/2" HWH (Ser) TF 3/16" Hd. (Qty. 2/per) (237-5937-01)		
3	Switch Diode, 1N4001	4	112-5001-00
4	Coil Mounting Bracket	1	535-7330-01
	Item 4 is secured to Item 1 by: #8-32 X 3/8" HWH Swage (Serr) Zinc (Qty. 4) (237-5975-00)		
5	Coil, 26-1200	1	090-5044-00T
	ORDERING ABOVE (ITEM 5) COIL PART № WILL INCLUDE:		
—	Diode, 1N4004 (positioned at top)	1	112-5003-00
6	Coil Sleeve	1	545-5076-00
7	Coil Retaining Bracket	1	535-5203-03
	Item 7 is secured to Item 2 by: #8-32 X 1/4" HWH (Serr) Zinc TF (Qty. 2) (237-5964-00)		
8	Plunger Assembly	1	515-5941-01
9	Compression Spring	1	266-5020-00
10	Rubber Bumper (Grommet)	1	545-5105-00

№	Individual Part Name	QTY.	SPI Part №
11	Trough Ball Guide Plate	1	535-7801-00
	Item 11 is secured to Item 1 by: 1/4" X 5/16" X .144" I.D. Spacer Tap. (Qty. 1) (254-5014-03) **and** #2-56 X 1/2" HWH (Ser) TF 3/16" Hd. (Qty. 1) (237-5937-01)		
12A	Dual OPTO Transmitter (TRANS) Bd.	1	520-5173-00
12B	Dual OPTO Receiver (REC) Board	1	520-5174-00
	Items 12A & 12B are secured to Item 1 by: OPTO PCB Tube Spacer (Brass) (Qty. 3/per) (530-5308-02), OPTO PCB Rubber Grommet (Qty. 3/per) (545-5518-00) **and** #6-32 X 5/8" HWH Swage (Serr) Zinc (Qty. 3/per) (237-5976-04)		
	5-Ball Trough Assy., 500-6318-25 is secured below the playfield by: #8 X 1/2" HWH AB (Zinc) Blue (Qty. 6) (234-5101-05)		

ASSOCIATED PARTS **ARE NOT INCLUDED** WITH THE ABOVE ASSEMBLY.

№	Associated Part Name	QTY.	SPI Part №
13	Ball Trough Enter / Exit Scoop	1	535-7329-01
	Item 13 secured to the playfield by: #8 X 1/2" HWH AB (Zinc) Blue (Qty. 4) (234-5101-05).		
14	Heat Shrink Tubing 1/8" ø PUI-24	3"	605-5006-00
n/a*	Steel Balls (1-1/16" ø)	5	260-5000-00

Flipper (Left) Assembly, 500-5944-14 (Items 1-12)
and Associated Part: Yellow Flipper Bat & Shaft Assy., 515-5133-06-05 (Item 13*)



IMPORTANT: When replacing Item ®11B, Pawl (Mntg. Link) Assy., we advise replacing with entire Item 11A, Flipper Plunger/Link Assy. due to overall wear & tear. Check all other components and replace as required.

Items 11A-11K Side View

Take Note:

* An asterisk (*) indicates item is *Not Shown* in pictorial.

® "R" indicates item has a riveted-on part, if removing/adding rivets is not an option, order the entire ® Sub-Assembly.

Nº	Individual Part Name	QTY.	SPI Part Nº
1	Flipper Base Plate Kit (Left)	1	515-6617-01
ORDERING ABOVE (ITEM 1) SUB-ASSY. PART Nº WILL INCLUDE:			
—	Flipper Base Plate (Left) comes threaded with all securing hardware (Thread Forming Screws) for Items 2, 3, 6 & 8.		
2	Flipper Bat Bushing	1	545-5594-00
Item 2 is secured to Item 1 by: #6-32 X 3/8" HWH Swage (Ser.) Zc. (Qty. 3) (237-5976-02)			
3	Power (End of Stroke) Switch	1	180-5149-00
Item 3 is secured to Item 1 by: #6-32 X 5/8" HWH Swage (Ser.) Zc. (Qty. 2) (237-5976-04)			
4	Switch Plate/Spring Return Lt. Brkt.	1	535-7354-01
5	Flipper Return Spring	1	265-5035-00
6	Coil Stop Sub-Assembly	1	515-6308-01
ORDERING ABOVE (ITEM 6) SUB-ASSY. PART Nº WILL INCLUDE:			
6A	Coil Stop with with .093" ø Hole	1	530-5350-01
6B	Shading Ring	1	530-5123-00
6C	Coil Stop Bracket	1	535-7355-00
Item 6 is secured to Item 1 by: #10-32 X 3/8" SHWH Swage (Serr) Zinc (Qty. 2) (237-5985-00) **and** #10 Split Lock Washer (Qty. 2) (244-5003-00)			
7	Spring Washer	1	269-5002-00
8	Coil Support Bracket	1	535-7356-00
Item 8 is secured to Item 1 by: #8-32 X 3/8" HWH Swage (Ser.) Zc. (Qty. 2) (237-5975-00)			
9	Coil, 23-1100 (ORG) (Left)	1	090-5030-00T
ORDERING ABOVE (ITEM 9) COIL PART Nº WILL INCLUDE:			
—	Diode, 1N4004 (positioned at top)	1	112-5003-00
10	Coil Sleeve	1	545-5388-00

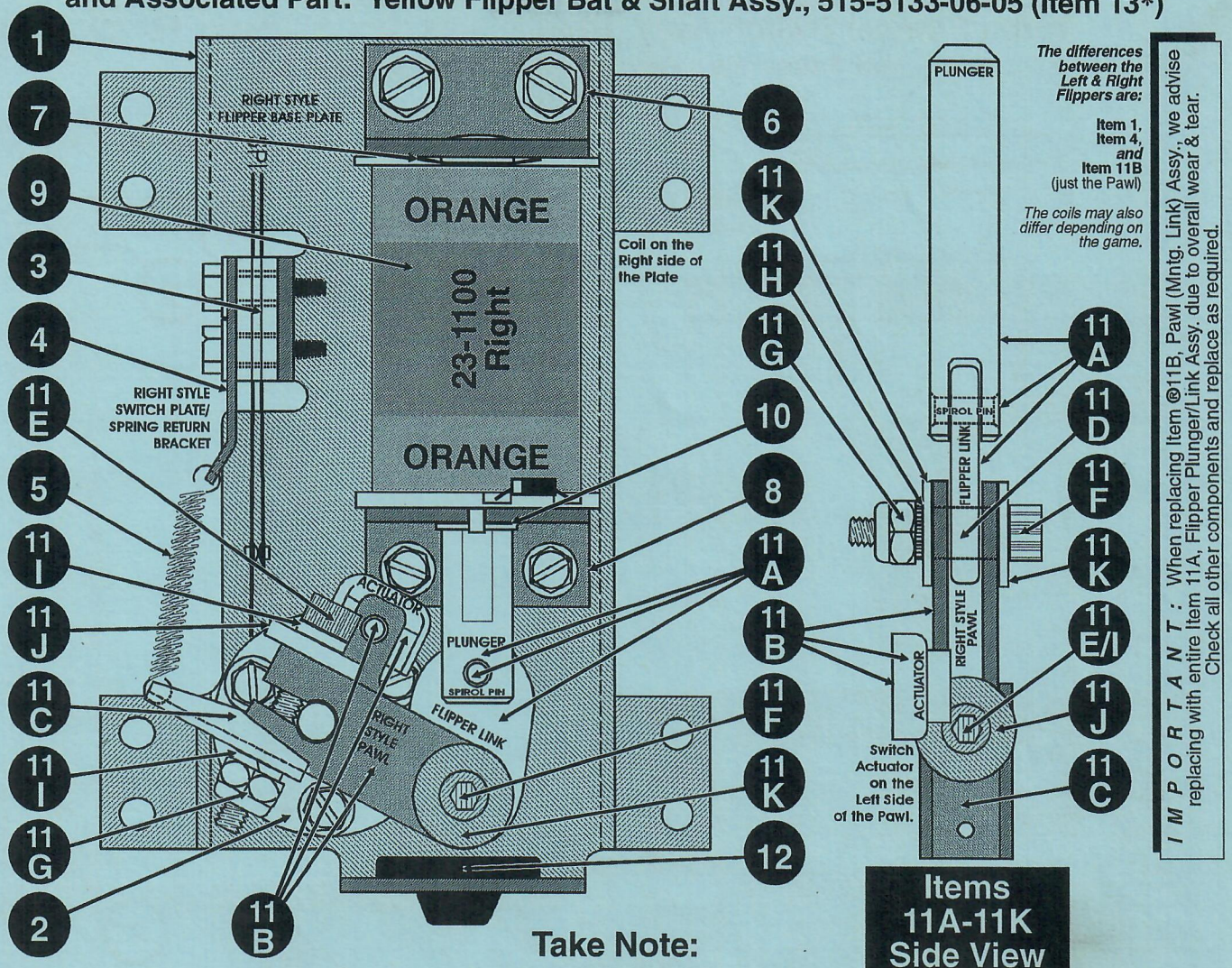
Nº	Individual Part Name	QTY.	SPI Part Nº
11	Plunger, Link & Pawl (Left) Sub-Assy.	1	515-6518-01
ORDERING ABOVE (ITEM 11) SUB-ASSY. PART Nº WILL INCLUDE:			
11A	**Flipper Plunger/Link Sub-Assy.**	1	515-6304-01
includes :	*Plunger "Flipper" Link*	*1*	*545-5611-00*
includes :	*Spirol Pin ø 5/32" X 7/16" Lg.*	*1*	*251-5015-01*
includes :	*Flipper Plunger with "Flat"*	*1*	*530-5349-01*
®11B	**Pawl (Mntg. Link) (Left) Sub-Assy.**	1	515-6305-01
includes :	*Pawl (Mounting Link) (Left) Plain*	*1*	*535-7271-01*
includes :	*Switch Actuator*	*1*	*545-5612-00*
includes :	*Rivet, 1/8" ø X 1/4" Lg.*	*1*	*249-5003-00*
11C	**Return Bracket**	1	535-7353-00
11D	Flipper Link Bushing (Metal, Ext.) (.385" Lg. X .192" ID X .312" OD)	1	530-5139-01
11E	#10-32 X 1-1/4" Lg. Socket Head	1	237-5950-01
11F	#10-32 X 7/8" Lg. Socket Head	1	237-5966-00
11G	#10-32 Nylon Stop Nut	2	240-5203-00
11H	#10 Star Washer	1	246-5002-00
11I	#10 Split Lock Washer	2	244-5003-00
11J	Washer .203" ID X .63" OD X .105" Thk W/cut	1	242-5039-01
11K	Washer .203" ID X .63" OD X .062" Thk	2	242-5038-00
12	Deflector Pad (Bumper)	1	545-5428-00

Flipper (Left) Assembly, 500-5944-14 Is secured below the playfield by: #10 X 1/2" HWH MS (Serr) Zinc ST (Qty. 8) (237-5949-00)

ASSOCIATED PARTS **ARE NOT INCLUDED** WITH THE ABOVE ASSEMBLY.

Nº	Associated Part Name	QTY.	SPI Part Nº
13*	Yellow Flipper Bat (Sega Saturn® Logo) & Shaft (Non-Knurled End) Assembly	1	515-5133-06-05
n/a*	Large Flipper **BLACK** Rubber Ring	1	545-5277-00

Flipper (Right) Assembly, 500-5944-04 (Items 1-12)
and Associated Part: Yellow Flipper Bat & Shaft Assy., 515-5133-06-05 (Item 13*)


RIGHT STYLE FLIPPER BASE PLATE
ORANGE
23-1100 Right
ORANGE
RIGHT STYLE SWITCH PLATE/ SPRING RETURN BRACKET
Coil on the Right side of the Plate
ACTUATOR
PLUNGER
SPIROL PIN
FLIPPER LINK
RIGHT STYLE PAWL
PLUNGER
SPIROL PIN
FLIPPER LINK
RIGHT STYLE PAWL
ACTUATOR
Switch Actuator on the Left Side of the Pawl.
The differences between the Left & Right Flippers are:
Item 1, Item 4, and Item 11B (just the Pawl)
The coils may also differ depending on the game.
IMPORTANT: When replacing Item ®11B, Pawl (Mntg. Link) Assy., we advise replacing with entire Item 11A, Flipper Plunger/Link Assy. due to overall wear & tear. Check all other components and replace as required.
Items 11A-11K Side View
Take Note:

® "R" indicates item has a riveted-on part, if removing/adding rivets is not an option, order the entire ® Sub-Assembly.

* An asterisk (*) indicates item is *Not Shown* in pictorial.

Nº	Individual Part Name	QTY.	SPI Part Nº
1	Flipper Base Plate Kit (Right)	1	515-6617-00
ORDERING ABOVE (ITEM 1) SUB-ASSY. PART Nº WILL INCLUDE:			
—	Flipper Base Plate (Right) comes threaded with all securing hardware (Thread Forming Screws) for Items 2, 3, 6 & 8.		
2	Flipper Bat Bushing	1	545-5594-00
Item 2 is secured to Item 1 by: #6-32 X 3/8" HWH Swage (Ser.) Zc. (Qty. 3) (237-5976-02)			
3	Power (End of Stroke) Switch	1	180-5149-00
Item 3 is secured to Item 1 by: #6-32 X 5/8" HWH Swage (Ser.) Zc. (Qty. 2) (237-5976-04)			
4	Switch Plate/Spring Return Rt. Brkt.	1	535-7354-00
5	Flipper Return Spring	1	265-5035-00
6	Coil Stop Sub-Assembly	1	515-6308-01
ORDERING ABOVE (ITEM 6) SUB-ASSY. PART Nº WILL INCLUDE:			
6A	Coil Stop with with .093" ø Hole	1	530-5350-01
6B	Shading Ring	1	530-5123-00
6C	Coil Stop Bracket	1	535-7355-00
Item 6 is secured to Item 1 by: #10-32 X 3/8" SHWH Swage (Serr) Zinc (Qty. 2) (237-5985-00) **and** #10 Split Lock Washer (Qty. 2) (244-5003-00)			
7	Spring Washer	1	269-5002-00
8	Coil Support Bracket	1	535-7356-00
Item 8 is secured to Item 1 by: #8-32 X 3/8" HWH Swage (Ser.) Zc. (Qty. 2) (237-5975-00)			
9	Coil, 23-1100 (ORG) (Right)	1	090-5030-00T
ORDERING ABOVE (ITEM 9) COIL PART Nº WILL INCLUDE:			
—	Diode, 1N4004 (positioned at top)	1	112-5003-00
10	Coil Sleeve	1	545-5388-00

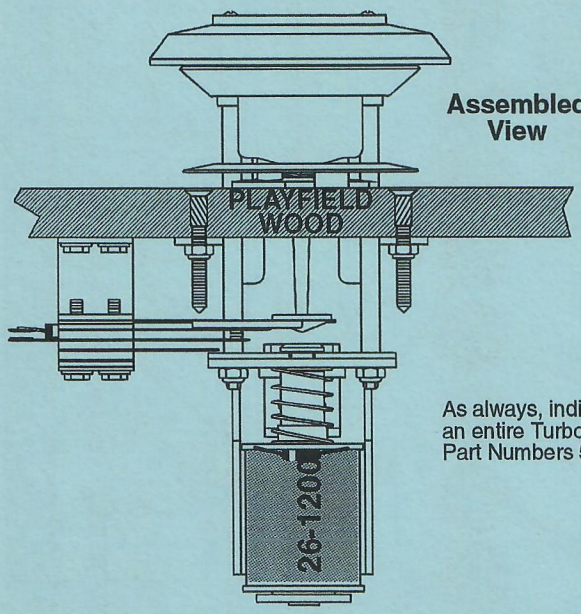
Nº	Individual Part Name	QTY.	SPI Part Nº
11	Plunger, Link & Pawl (Rt.) Sub-Assy.	1	515-6518-00
ORDERING ABOVE (ITEM 11) SUB-ASSY. PART Nº WILL INCLUDE:			
11A	**Flipper Plunger/Link Sub-Assy.**	1	515-6304-01
includes :	*Plunger "Flipper" Link*	*1*	*545-5611-00*
includes :	*Spirol Pin ø 5/32" X 7/16" Lg.*	*1*	*251-5015-01*
includes :	*Flipper Plunger with "Flat"*	*1*	*530-5349-01*
®11B	**Pawl (Mntg. Link) (Rt.) Sub-Assy.**	1	515-6305-00
includes :	*Pawl (Mounting Link) (Rt.) Plain*	*1*	*535-7271-00*
includes :	*Switch Actuator*	*1*	*545-5612-00*
includes :	*Rivet, 1/8" ø X 1/4" Lg.*	*1*	*249-5003-00*
11C	**Return Bracket**	1	535-7353-00
11D	Flipper Link Bushing (Metal, Ext.) (.385" Lg. X .192" ID X .312" OD)	1	530-5139-01
11E	#10-32 X 1-1/4" Lg. Socket Head	1	237-5950-01
11F	#10-32 X 7/8" Lg. Socket Head	1	237-5966-00
11G	#10-32 Nylon Stop Nut	2	240-5203-00
11H	#10 Star Washer	1	246-5002-00
11I	#10 Split Lock Washer	2	244-5003-00
11J	Washer .203" ID X .63" OD X .105" Thk w/cut	1	242-5039-01
11K	Washer .203" ID X .63" OD X .062" Thk	2	242-5038-00
12	Deflector Pad (Bumper)	1	545-5428-00

Flipper (Right) Assembly, 500-5944-04 is secured below the playfield by: #10 X 1/2" HWH MS (Serr) Zinc ST (Qty. 8) (237-5949-00)

ASSOCIATED PARTS **ARE NOT INCLUDED** WITH THE ABOVE ASSEMBLY.

Nº	Associated Part Name	QTY.	SPI Part Nº
13*	Yellow Flipper Bat (Sega Saturn® Logo) & Shaft (Non-Knurled End) Assembly	1	515-5133-06-05
n/a*	Large Flipper **BLACK** Rubber Ring	1	545-5277-00

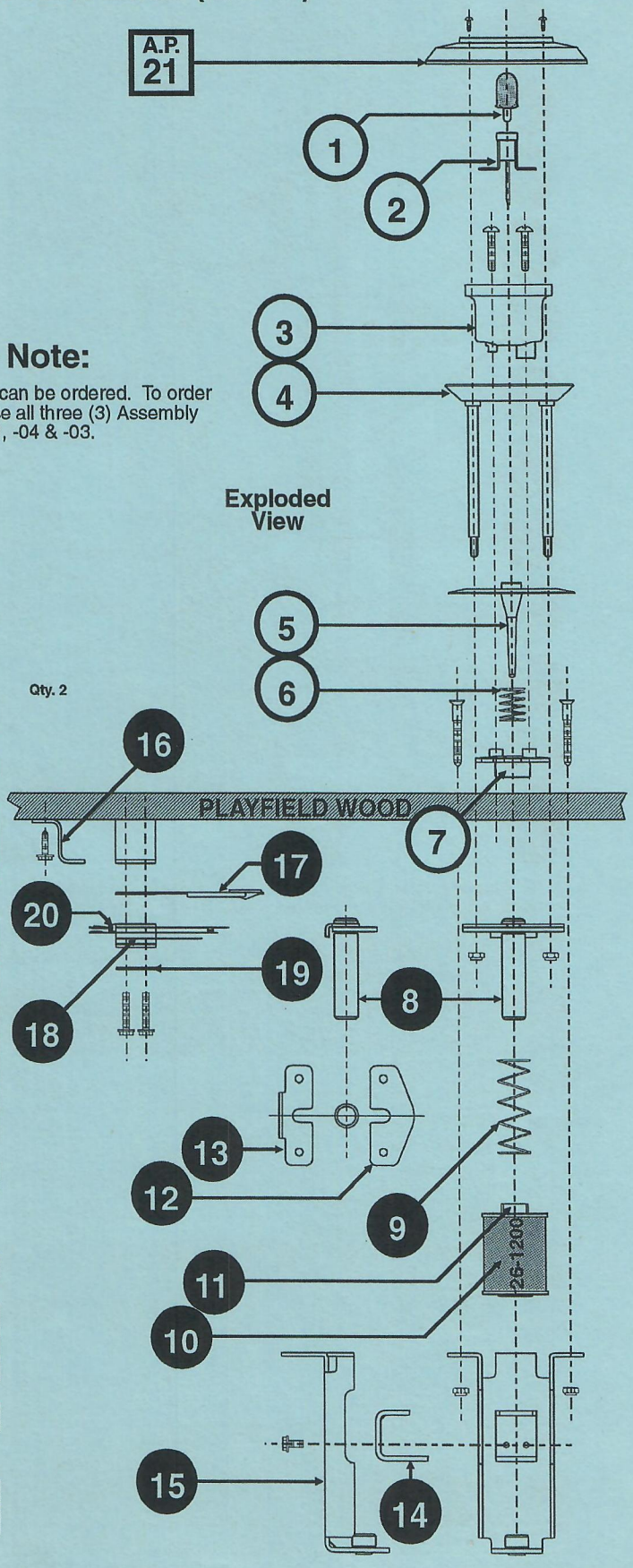
Turbo Bumper Top Assy., 515-6459-01 (Qty. 3) (Items 1-7), Turbo Bumper Bottom Assy., 515-6459-04 (Qty. 3) (Items 8-15), Turbo Bumper Switch Assy., 515-6459-03 (Qty. 3) (Items 16-20) and Associated Part: See Table Below (Item 21)



Assembled View

Take Note:

As always, individual parts can be ordered. To order an entire Turbo Bumper, use all three (3) Assembly Part Numbers 515-6459-01, -04 & -03.



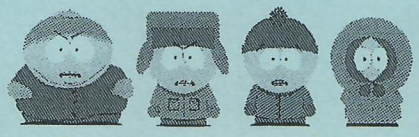
Exploded View

Nº	Individual Part Name	QTY.	SPI Part Nº
Turbo Bumper Top Assy., 515-6459-01 (Items 1-7)			
1	#555 Wedge Base Bulb	1	165-5002-00
2	#555 Wedge Base Socket	1	077-5206-00
3	Bumper Body	1	545-5197-00
Item 3 is secured by: #5 X 7/8" PRH AB (Zinc) (Qty. 2) (237-5826-00)			
4	Ring Assembly	1	515-5085-00
Item 4 is secured by: #6-32 Nylon Stop Nut (Qty. 2) (240-5005-00)			
5	Bumper Skirt	1	545-5607-00
6	Bumper Skirt Spring	1	266-5048-00
7	Bumper Base	1	545-5195-00
Turbo Bumper Bottom Assy., 515-6459-04 (Items 8-15)			
8	Plunger	1	530-5348-00
9	Coil Spring	1	266-5047-00
10	Coil, 26-1200	1	090-5044-00T
ORDERING ABOVE (ITEM 10) COIL PART Nº WILL INCLUDE:			
—	Diode, 1N4004 (positioned at top)	1	112-5003-00
11	Coil Sleeve	1	545-5031-00
12	Fiber Yoke	1	545-5609-00
13	Metal Yoke	1	535-7346-00
14	Metal Yoke Stop	1	535-7347-00
Item 14 is secured by: #6-32 X 1/4" HWH Swage (Serr.) Zinc (Qty. 2) (237-5976-01)			
15	Coil Bracket Welded Assembly	1	515-5939-00
Item 15 is secured by: #6-32 X 1-3/16" Spiral Fin Shank (Qty. 3) (237-5957-00) **and** #6-32 Nylon Stop Nut (Qty. 3) (240-5005-00)			
Turbo Bumper Switch Assy., 515-6459-03 (Items 16-20)			
16	Switch Bracket	1	535-7342-00
Item 16 is secured by: #8 X 1/2" HWH AB (Zinc) Blue (Qty. 2) (234-5101-05)			
17	Spoon Switch Actuator	1	545-5610-01
18	Turbo Bumper Stack (Blade) Switch	1	180-5015-03
19	Switch Body Protect Plate	1	535-7344-00
Items 18 & 19 are secured by: #6-32 X 3/4" HWH Swage (Serr) Zc. (Qty. 2) (237-5976-05)			
20	Switch Diode, 1N4001	1	112-5001-00

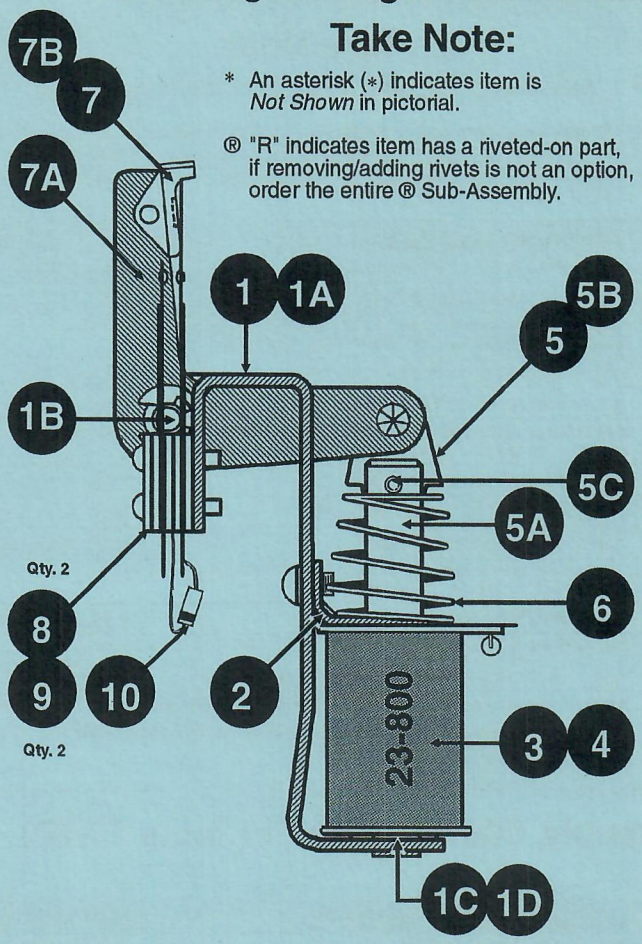
The Top & Bottom Assemblies are secured together by hardware included in assemblies.

ASSOCIATED PARTS **ARE NOT INCLUDED** WITH THE ABOVE ASSEMBLY.

Nº	Associated Part Name	QTY.	SPI Part Nº
21	Red Pop Cap (Plastic)	3	550-5057-02
Item 21 is secured to Item 4 by: #4 X 3/4" PRH (Zinc) (Qty. 2/per) (237-5873-00)			



Left & Right Slingshot Assemblies, 500-5849-00 (Qty. 2) (Items 1-10)



Take Note:

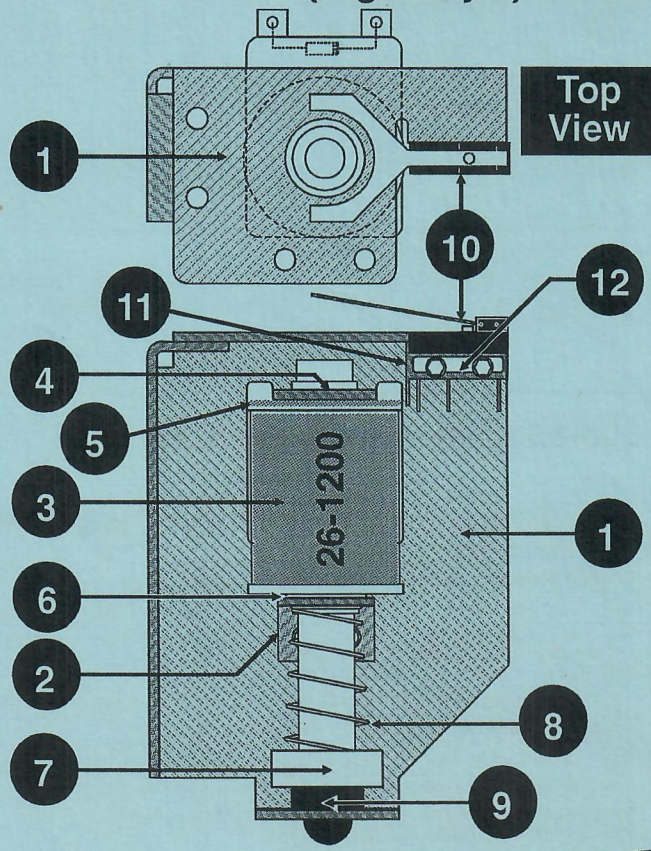
* An asterisk (*) indicates item is *Not Shown* in pictorial.

® "R" indicates item has a riveted-on part, if removing/adding rivets is not an option, order the entire ® Sub-Assembly.

Nº	Individual Part Name	QTY.	SPI Part Nº
1	Slingshot Bracket Assembly	1	515-5339-01
ORDERING ABOVE (ITEM 1) SUB-ASSY. PART Nº WILL INCLUDE:			
1A	Slingshot Bracket	1	535-5919-01
1B	Hinge Stud	1	530-5034-01
1C	Armature Stop	1	530-5017-01
1D	Shading Ring	1	530-5307-00
2	Coil Retaining Bracket	1	535-5203-03
Item 2 is secured to Item 1 by: #8-32 X 1/4" PPH MS (Sems) Zinc (Qty. 2) (232-5300-00)			
3	Coil, 23-800	1	090-5001-00T
ORDERING ABOVE (ITEM 3) COIL PART Nº WILL INCLUDE:			
—	Diode, 1N4004 (positioned at top)	1	112-5003-00
4	Coil Sleeve	1	545-5031-00
5	Plunger & Link Assembly	1	515-5338-00
ORDERING ABOVE (ITEM 5) SUB-ASSY. PART Nº WILL INCLUDE:			
5A	Plunger 2" Lg.	1	530-5025-01
5B	Plunger Link	1	545-5293-00
5C	Roll Pin 1/8" ø x 5/8" Lg.	1	251-5008-00
Item 5B is secured to Item 1 by: Retaining Ring, 1/4" ø Shaft (Qty. 1) (270-5002-00)			
6	Compression Return Spring	1	266-5020-00
7®	Riveted Arm & Tip Assembly	1	515-5340-01
ORDERING ABOVE ® RIVETED ASSY. PART Nº WILL INCLUDE:			
7A	Arm	1	515-5341-01
7B	Kicker Tip	1	545-5216-01
7C	Rivet, 1/8" ø x 1/4" Lg.	1	249-5003-00
Item 7A is secured to Item 1B by: Retaining Ring, 1/4" ø Shaft (Qty. 1) (270-5002-00)			
8	Slingshot Stack (Blade) Switch	2	180-5054-00
9	Switch Body Protect Plate	2	535-5045-00
Items 8 & 9 are secured to Item 1 by: #6-32 X 5/8" HWH Swage (Serr) Zinc (Qty. 2/per) (237-5976-04)			
10	Switch Diode, 1N4001	2	112-5001-00

Slingshot Assemblies (Qty. 2), 500-5849-01 are secured below the playfield by: #8 X 1/2" HWH AB (Zinc) Blue (Qty. 3/per) (234-5101-05)

VUK (Right Style) Assembly, 500-6290-01 (Items 1-13)



Take Note:

* An asterisk (*) indicates item is *Not Shown* in pictorial.

1. Note: The Switch Diode, 1N4001, is not located on this assembly (nor included); it's located on a *Terminal Strip* under the playfield.

Nº	Individual Part Name	QTY.	SPI Part Nº
1	VUK Coil Mounting Bracket (Right Style)	1	535-8296-01
2	Coil Retaining Bracket	1	535-5203-03
Item 2 is secured by: #8-32 X 1/4" PPH MS (Sems) Zinc (Qty. 2) (232-5300-00)			
3	Coil, 26-1200	1	090-5044-00T
ORDERING ABOVE (ITEM 3) COIL PART Nº WILL INCLUDE:			
—	Diode, 1N4004 (positioned at top)	1	112-5003-00
4	Coil Sleeve	1	545-5076-00
5	Coil Lug Insulator (Fiche Paper)	1	545-5431-00
6	Spring Washer, 17/32" ID X 3/4" X 1"	1	269-5002-00
7	Plunger Assembly	1	515-5941-01
8	Compression (Relay) Spring	1	266-5020-00
9	Rubber Bumper (Grommet)	1	545-5105-00
10	Micro Switch ("Y" Actuator)	1	180-5116-01
11	Switch Lug Insulator (Fiche Paper)	1	545-5759-00
12	Switch Body Protect Plate	1	535-6539-00
Items 10, 11 & 12 are secured by: #2-56 X 1/2" HWH MS (Serr) Zinc Thread-Forming 3/16" (Qty. 2) (237-5937-01)			
13*	Diode, 1N4001 (On Terminal Strip)	1	112-5001-00

VUK (Right Style) Assembly, 500-6290-01 Is secured under the playfield by: Wood VUK Spacer (Qty. 1) (525-5548-00) **and** #8 X 3/4" HWH AB (Zinc) (Qty. 3) (234-5103-00)

Toilet & Frame Assembly, 500-6360-00-71 (Items 1-16)

Take Note:

* An asterisk (*) indicates items are not noted in the pictorial.

® "R" indicates item has a riveted-on part(s), if removing/adding rivets is not an option, order the entire ® Sub-Assembly. ***Please Note:*** If the ® Sub-Assembly **Is not** available, call Technical Support.

Nº	Individual Part Name	QTY.	SPI Part Nº
1®	Riveted Toilet Frame Weldment	1	515-7007-00-71
ORDERING ABOVE ® RIVETED ASSY. PART Nº WILL INCLUDE:			
1A	Toilet Frame Weldment	1	515-6991-00
1B	Toilet Lid Hinge Weldment (Black)	1	390-5043-00
1C*	Rivet, 1/8" ø X 5/32" Lg.	2	249-5009-00
2	Toilet (White Molded Plastic, Altered)	1	880-5033-00
Item 2 is secured to Item 1A by: #6-32 X 3/8" HWH Swage (Ser) Zinc (Qty. 4) (237-5976-02) **and** #6 Washer (Qty. 4) (242-5001-00)			
3	Toilet Hinge Welded Assembly	1	515-7000-00
4	Toilet Lid Stop Bracket	1	535-8546-00
Item 3 (bottom half) & Item 4 are secured to Item 1A by: #6-32 X 1/2" PPH MS (Sems) Zinc (Qty. 2) (232-5202-00) **and** #6-32 Nylon Stop Nut (Qty. 2) (240-5005-00).			
5	Tank Lid Mounting Plate	1	515-6997-00
Item 5 is secured to Item 3 (top half) by: #6-32 X 3/8" PPH MS (Sems) (Qty. 2) (232-5201-00) **and** #6-32 Nylon Stop Nut (Qty. 2) (240-5005-00)			
6	Tank Lid (White Molded Plastic, Altrd.)	1	880-5033-01
Item 6 is secured to Item 5 by: #6-32 X 3/8" PPH MS (Sems) (Qty. 2) (232-5201-00) **and** #6 Washer (Qty. 2) (242-5001-00)			
7	Spring (used in Drop Targets)	1	265-5003-00

Nº	Individual Part Name	QTY.	SPI Part Nº
8	Plastic Edge Protector 2"	1	545-5930-02
9	Laydown Wedge Base Socket	2	077-5026-01
Item 9 is secured to Item 1A by: #6-32 X 3/8" PPH MS (Sems) Zinc (Qty. 1/per) (232-5201-00) **and** #6-32 Nylon Stop Nut (Qty. 1/per) (240-5005-00)			
10	#906 Wedge Base Bulb (Red)	2	165-5004-02
11	Wedge Base Offset Socket	2	077-5029-00
Item 11 is secured to Item 1A by: #6-32 X 3/8" PPH MS (Sems) Zinc (Qty. 1/per) (232-5201-00) **and** #6-32 Nylon Stop Nut (Qty. 1/per) (240-5005-00)			
12	#555 Wedge Base Bulb	2	165-5002-00
13*	Rubber Lite Cover GREEN	2	545-5014-04
14	Toilet Lid Seat (Black)	1	830-5968-00
Item 14 is secured to Item 1B by: #6-32 X 1/2" PFH MS (Zinc) (Qty. 2) (237-5918-00) **and** #6-32 Nylon Stop Nut (Qty. 2) (240-5005-00)			
15	Ball Stop (Snubber) Bracket	1	515-6992-00
Item 15 is secured to Item 14 by: #6-32 X 3/8" PFH MS (Zinc) (Qty. 2) (237-5850-00)			
16	Black Sponge Rubber Pad (Self-Adh.)	1	626-5050-00
Item 16 is secured onto Item 14 as a Ball Guide. The Dimensions: 1/8" X 1/4" X 2-1/2"			

Toilet & Frame Assembly, 500-6360-00-71 is secured above the playfield by: #6-32 X 7/8" PFH (Zinc) (Qty. 7) (237-6021-00)

Mr. Hankey & Tank Lid Lift Coil Assembly, 500-6391-00-71 (Items 17-30)

Nº	Individual Part Name	QTY.	SPI Part Nº
17	Coil & Trip Coil Mntg. Brkt. Weldment	1	515-6983-00
18	Coil Support (Retainer) Bracket (Lrg.)	2	535-7356-00
Item 18 is secured to Item 17 by: #8-32 X 3/8" HWH Swage (Serr.) Zinc (Qty. 2/per) (237-5975-00)			
19	Coil, 23-1100	1	090-5030-00T
ORDERING ABOVE (ITEM 19) COIL PART Nº WILL INCLUDE:			
—	Diode, 1N4004 (positioned at top)	1	112-5003-00
20	Coil Sleeve (with Extension)	1	545-5847-00
21	Spring Washer	1	269-5002-00
22	Drive Plunger (Main)	1	530-5539-01
23	Plunger Spring	1	266-5063-01
24	Metal Yoke Weldment	1	515-6986-00
25	Fiber Yoke	1	545-5609-00
Item 25 is secured to Item 24 by: #6-32 X 3/8" HWH Swg. (Ser.) Zc. (Qty. 2) (237-5976-02)			
26	Shaft (Drive Plunger Guide)	1	530-5540-00
Item 26 is secured to Item 17 by: Retaining Ring, 1/4" ø Shaft (Qty. 2) (270-5002-00)			

Nº	Individual Part Name	QTY.	SPI Part Nº
27	Trip Coil Assembly	1	515-6985-00
ORDERING ABOVE (ITEM 27) SUB-ASSY. PART Nº WILL INCLUDE:			
27A	Trip Coil Frame Top	1	535-6198-00
27B	Trip Coil Frame (Weldment) Bottom	1	535-6198-01
27C®	Trip Coil Arm Riveted Assembly	1	515-6984-01
27D	Return Spring	1	265-5024-00
27E	Coil, 29-1000	1	090-5059-00
27F*	Coil Lug Insulator (Fiche Paper)	1	545-5431-00
Item 27 is secured to Item 17 by: #8-32 X 3/8" PPH MS (Sems) Zc. (Qty. 1) (232-5301-00)			
28	Mr. Hankey Mtng. Brkt. Weldment	1	515-6996-00
Item 28 is secured to Item 22 by: #8-32 X 1/2" PPH MS (Sems) Zc. (Qty. 2) (232-5302-00)			
29	South Park Mr. Hankey (3.5" Figurine)	1	880-5029-00
Item 29 is secured to Item 28 by: #6-32 X 7/8" PFH Zinc (Qty. 2) (237-6021-00) **and** 1/4" X 3/8" Spacer Gray (Qty. 1, Bottom) (254-5000-02)			
30	Rubber Bumper (Grommet)	1	545-5105-00

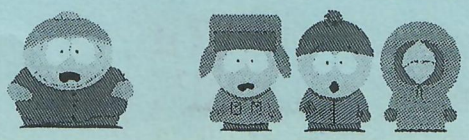
Mr. Hankey & Tank ... Coil Assy., 500-6391-00-71 is secured below the playfield by: #8 X 1/2" HWH AB (Zinc) Blue (Qty. 7) (234-5101-05)

Toilet Lid Lift Coil Assembly, 500-6392-00-71 (Items 31-40)

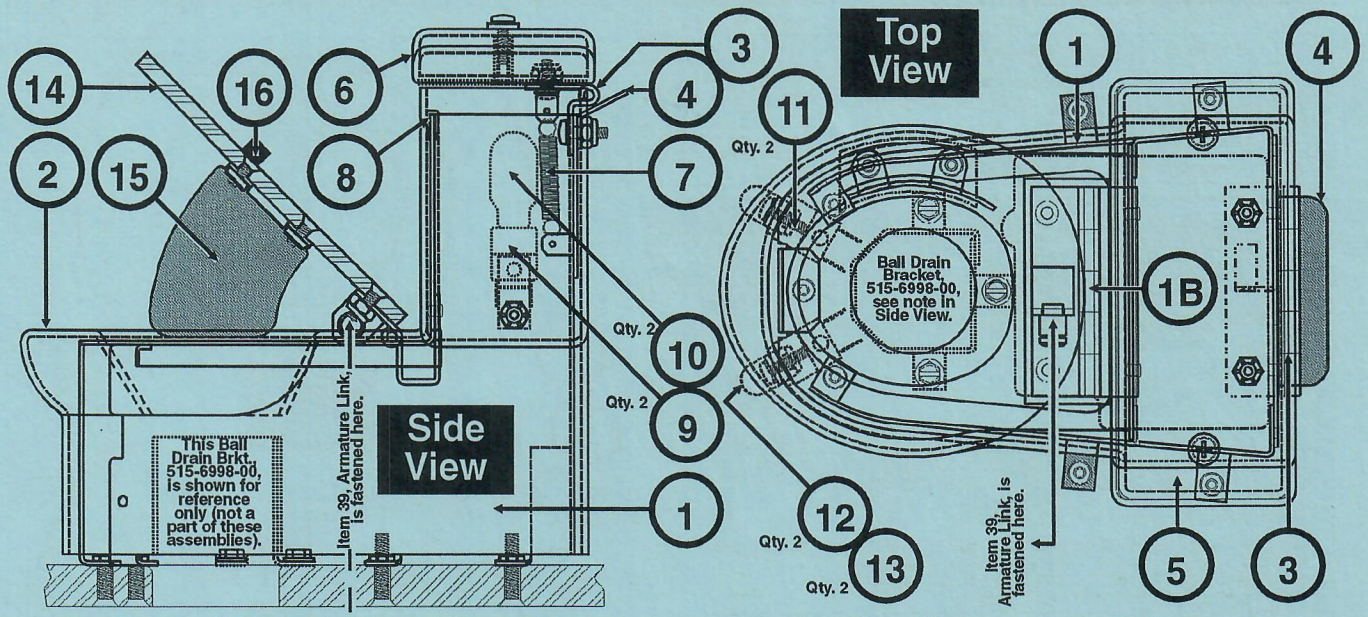
Nº	Individual Part Name	QTY.	SPI Part Nº
31	Coil Mounting Bracket Weldment	1	515-6993-00
32	Coil Support (Retainer) Bracket (Lrg.)	1	535-7356-00
Item 32 is secured to Item 31 by: #8-32 X 3/8" HWH Swage (Sr.) Zc (Qty. 2) (237-5975-00)			
33	Coil, 23-1100	1	090-5030-00T
ORDERING ABOVE (ITEM 33) COIL PART Nº WILL INCLUDE:			
—	Diode, 1N4004 (positioned at top)	1	112-5003-00
34	Coil Sleeve (with Extension)	1	545-5847-00
35	Toilet Lid Plunger Assembly	1	515-6994-00
36	Compression Spring	1	266-5022-01

Nº	Individual Part Name	QTY.	SPI Part Nº
37	Plunger Head	1	530-5511-00
Item 37 is secured to Item 35 by: #10-32 X 3/8" PPH MS (Sms) Zc. (Qty. 1) (232-5401-00)			
38	Armature Link	1	535-8535-00
Item 38 is secured to Item 35 by: Spirol Spring Pin 5/32" X 7/16" (Qty. 1) (251-5015-01) **and Item 38 is secured to Item 1B (Toilet & Frame Assy.) by:** Retaining Ring, 5/16" ø Shaft (Zinc) (Qty. 1) (270-5003-00)			
39	Adjustment Spindle Stop Bracket	1	535-8303-00
Item 39 is secured to Item 31 by: #8-32 X 3/8" HWH Swage (Sr.) Zc (Qty. 2) (237-5975-00)			
40	#10-32 Adj. Spindle Stop w/Rubber Tip	1	280-5014-00
Item 40 is secured to Item 39 by: #10-32 Keps Nut (Qty. 1) (240-5208-00)			

Toilet Lid Lift Coil Assy., 500-6392-00-71 is secured below the playfield by: #8 X 1/2" HWH AB (Zinc) Blue (Qty. 4) (234-5101-05)

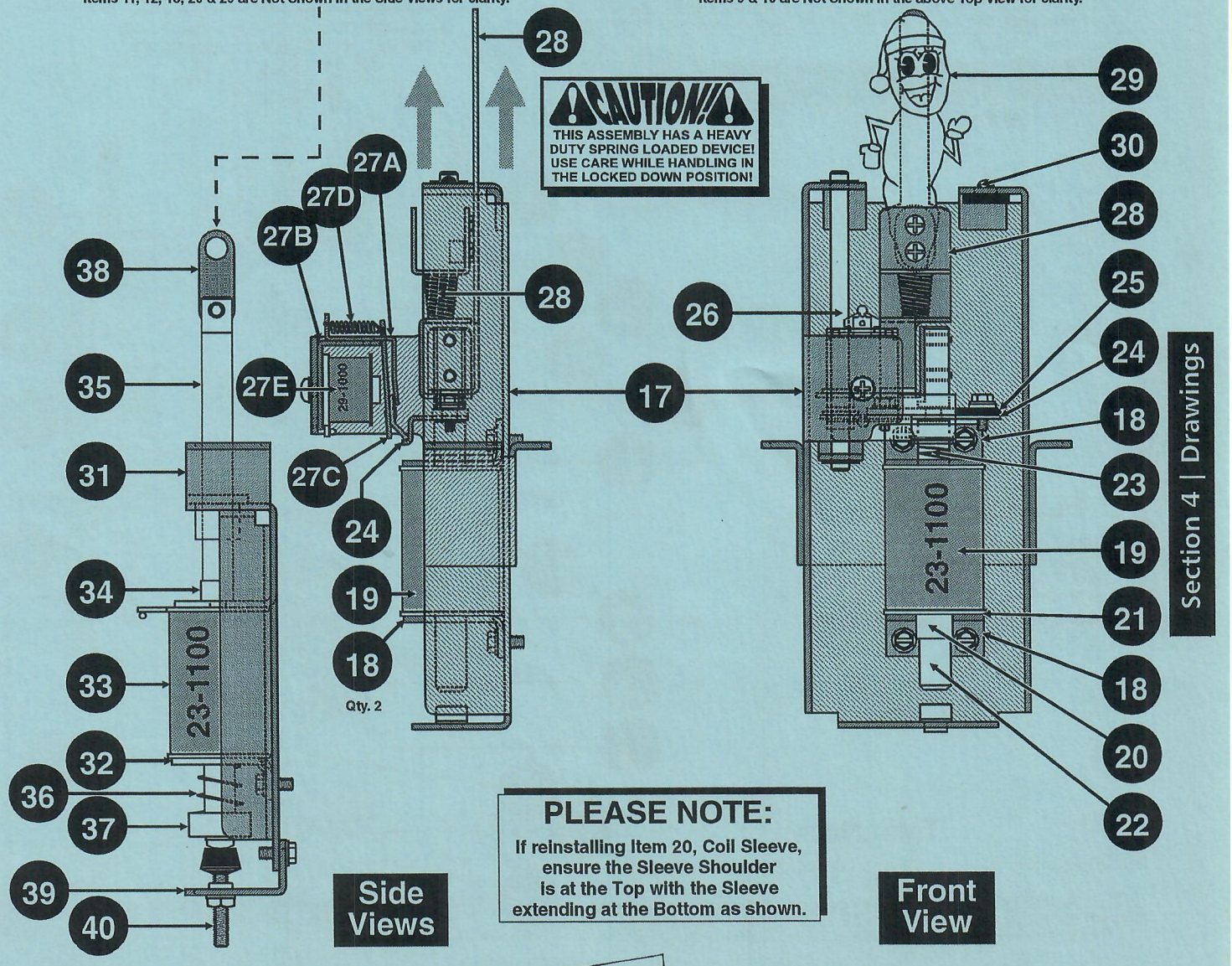


Toilet & Frame Assembly, 500-6360-00-71 (Items 1-16), Mr. Hankey & Tank Lid Lift Coil Assy., 500-6391-00-71 (Items 17-30) and Toilet Lid Lift Coil Assembly, 500-6392-00-71 (Items 31-41) *Continued*


Top View
Side View
Ball Drain Bracket, 515-6998-00, see note in Side View.
This Ball Drain Brkt., 515-6998-00, is shown for reference only (not a part of these assemblies).
Item 39, Armature Link, is fastened here.
Qty. 2

Items 11, 12, 13, 26 & 29 are Not Shown in the Side Views for clarity.

Items 9 & 10 are Not Shown in the above Top View for clarity.


CAUTION!
THIS ASSEMBLY HAS A HEAVY DUTY SPRING LOADED DEVICE! USE CARE WHILE HANDLING IN THE LOCKED DOWN POSITION!
23-1100
Qty. 2
Side Views
Front View

PLEASE NOTE:

If reinstalling Item 20, Coil Sleeve, ensure the Sleeve Shoulder is at the Top with the Sleeve extending at the Bottom as shown.

Kenny Assembly, 500-6358-00-71 (Items 1-23)

Nº	Individual Part Name	QTY.	SPI Part Nº
1	South Park Kenny (6" Figurine) Altrd.	1	880-5024-00
2	Platform Bracket Weldment	1	515-6978-00
3	Nyliner - 1/4" ø (Thomson #4L1-FF)	4	545-5423-00

Item 3 has a Qty. 2 in Item 2 & Qty. 2 in Item 15.

4	Pem Stud Plate (Inside Kenny)	1	535-8528-00

Item 4 is secured to Item 2 by: #8-32 Nylon Stop Nut (Qty. 3) (240-5102-00)

5®	Riveted Lamp Bracket Assembly	1	515-7006-00-71
ORDERING ABOVE ® RIVETED ASSY. PART Nº WILL INCLUDE:			
5A	Lamp Assembly Bracket	1	535-8527-00
5B	Laydown Wedge Base Socket	2	077-5026-01
5C*	Rivet, 1/8" ø X 3/16" Lg.	1	249-5001-00
5E*	#6 Riveting Lock Washer	1	246-5000-00

Item 5 is secured to Item 2 by: #6-32 X 3/8" PPH MS (Sems) Zinc (Qty. 1) (232-5201-00)

6	#555 Wedge Base Bulb	1	165-5002-00
7	#906 Wedge Base Bulb	1	165-5004-00
8	Main Mntg. (Double-Coil) Brkt. Assy.	1	515-6976-00

Item 8 is secured to Item 15 (at the Top) by: Nylon Washer 25/64" ID X 3/4" OD X 1/16" (Qty. 2, 1 between Item 8 & 15, 1 with Steel Washer) (242-5049-00), Steel Washer 13/32" ID X 13/16" OD X 1/16" (Qty. 1) (242-5050-00) **and** Retaining Ring, 3/8" ø Shaft (Qty. 1) (270-5012-00)

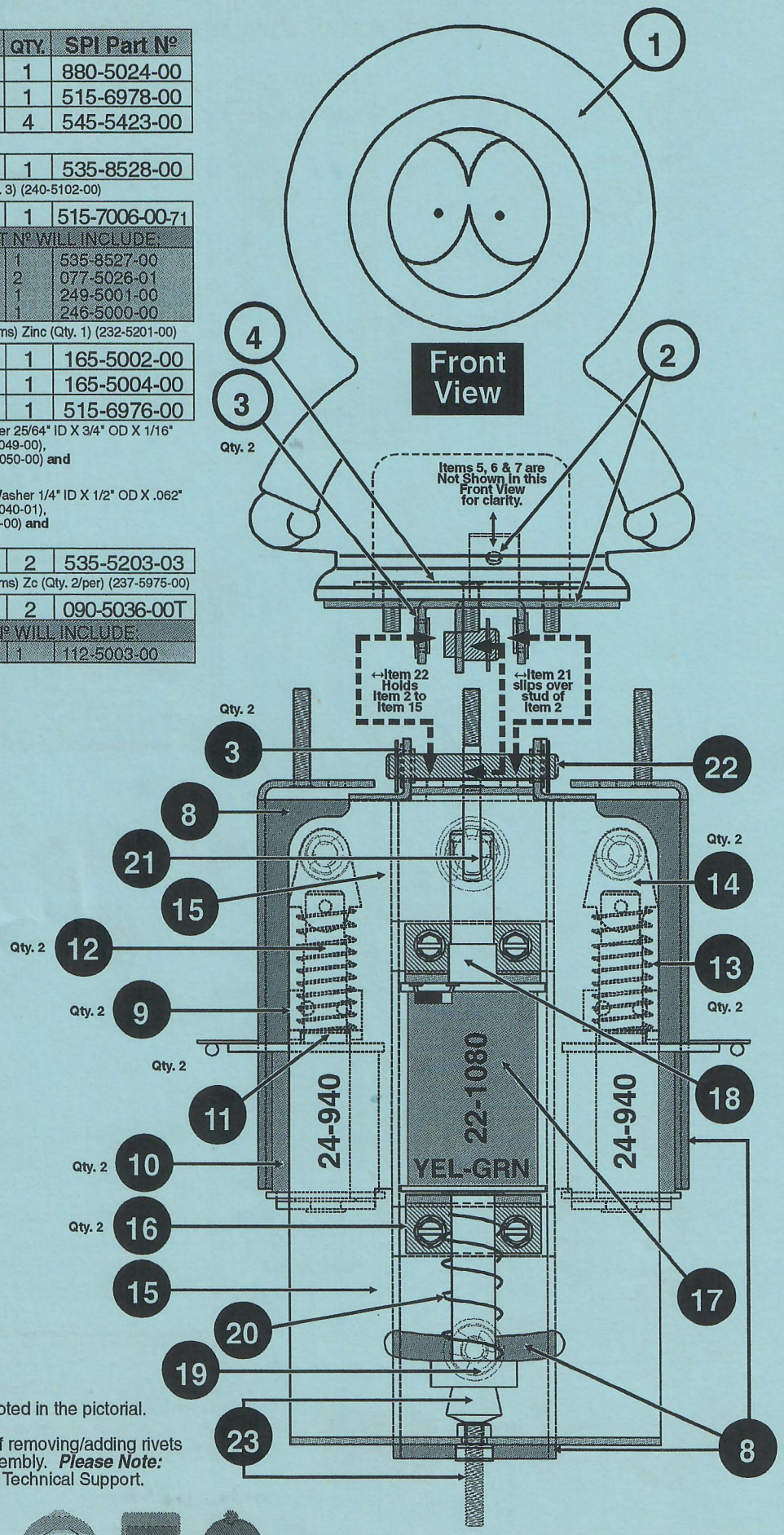
Item 8 is secured to Item 15 (at the Bottom) by: Teflon Washer 1/4" ID X 1/2" OD X .062" (Qty. 2, 1 between Item 8 & 15, 1 with Steel Washer) (242-5040-01), Steel Washer 9/32" ID X 5/8" OD X 1/16" (Qty. 1) (242-5051-00) **and** Retaining Ring, 1/4" ø Shaft (Qty. 1) (270-5002-00)

9	Coil Retainer Bracket	2	535-5203-03

Item 9 is secured to Item 8 by: #8-32 X 1/4" PPH MS (Sems) Zc (Qty. 2/per) (237-5975-00)

10	Coil, 24-940	2	090-5036-00T
ORDERING ABOVE (ITEM 10) COIL PART Nº WILL INCLUDE:			
—	Diode, 1N4004 (positioned at top)	1	112-5003-00

Parts Table continued on next page...


Front View
Items 5, 6 & 7 are Not Shown in this Front View for clarity.
↔Item 22 Holds Item 2 to Item 15
↔Item 21 slips over stud of Item 2
Qty. 2
24-940
22-1080
YEL-GRN
24-940

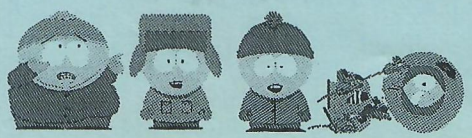
PLEASE NOTE:

If reinstalling Item 18, Coil Sleeve, ensure the Sleeve Shoulder is at the Bottom with the Sleeve extending at the Top as shown.

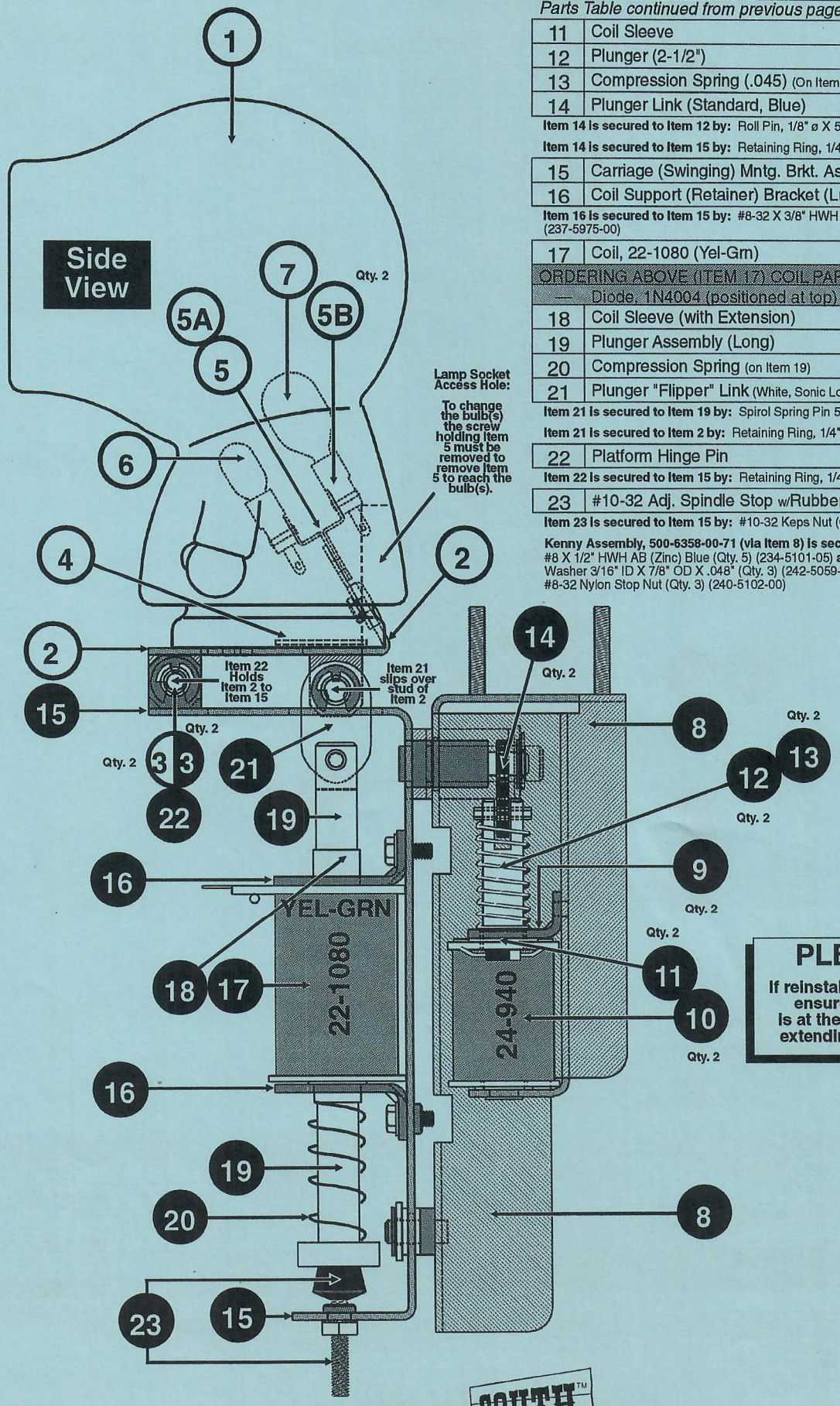
Take Note:

* An asterisk (*) indicates items are not noted in the pictorial.

® "R" indicates item has a riveted-on part(s), if removing/adding rivets is not an option, order the entire ® Sub-Assembly. ***Please Note:*** If the ® Sub-Assembly **Is not** available, call Technical Support.



Kenny Assembly, 500-6358-00-71 (Items 1-23) *Continued*


Side View
Qty. 2
Lamp Socket Access Hole:
To change the bulb(s) the screw holding Item 5 must be removed to remove Item 5 to reach the bulb(s).
Item 22 Holds Item 2 to Item 15
Item 21 slips over stud of Item 2
Qty. 2
YEL-GRN
22-1080
24-940

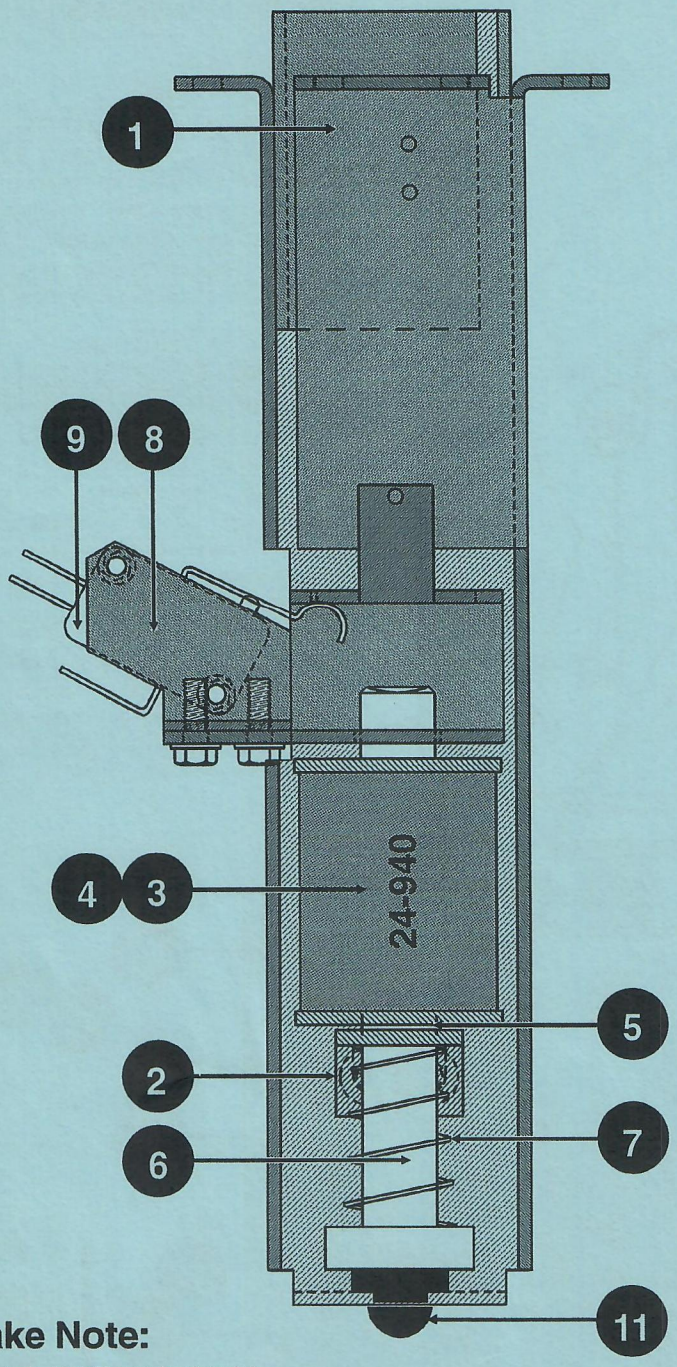
Nº	Individual Part Name	QTY.	SPI Part Nº
Parts Table continued from previous page...			
11	Coil Sleeve	2	545-5031-00
12	Plunger (2-1/2")	2	530-5025-02
13	Compression Spring (.045) (On Item 12)	2	266-5034-06
14	Plunger Link (Standard, Blue)	2	545-5293-00
Item 14 is secured to Item 12 by: Roll Pin, 1/8" ø X 5/8" Lg. (Qty. 1/per) (251-5008-00)			
Item 14 is secured to Item 15 by: Retaining Ring, 1/4" ø Shaft (Qty. 1/per) (270-5002-00)			
15	Carriage (Swinging) Mntg. Brkt. Assy.	1	515-6977-00
16	Coil Support (Retainer) Bracket (Lrg.)	2	535-7356-00
Item 16 is secured to Item 15 by: #8-32 X 3/8" HWH Swage (Serr.) Zinc (Qty. 2/per) (237-5975-00)			
17	Coil, 22-1080 (Yel-Grn)	1	090-5032-00T
ORDERING ABOVE (ITEM 17) COIL PART Nº WILL INCLUDE:			
—	Diode, 1N4004 (positioned at top)	1	112-5003-00
18	Coil Sleeve (with Extension)	1	545-5847-00
19	Plunger Assembly (Long)	1	515-6792-01
20	Compression Spring (on Item 19)	1	266-5020-00
21	Plunger "Flipper" Link (White, Sonic Logo)	1	545-5611-00
Item 21 is secured to Item 19 by: Spirol Spring Pin 5/32" X 1/2" (Qty. 1) (251-5015-00)			
Item 21 is secured to Item 2 by: Retaining Ring, 1/4" ø Shaft (Qty. 1) (270-5002-00)			
22	Platform Hinge Pin	1	530-5537-00
Item 22 is secured to Item 15 by: Retaining Ring, 1/4" ø Shaft (Qty. 2) (270-5002-00)			
23	#10-32 Adj. Spindle Stop w/Rubber Tip	1	280-5014-00
Item 23 is secured to Item 15 by: #10-32 Keps Nut (Qty. 1) (240-5208-00)			

Kenny Assembly, 500-6358-00-71 (via Item 8) is secured under the playfield by: #8 X 1/2" HWH AB (Zinc) Blue (Qty. 5) (234-5101-05) **and above the playfield by:** Washer 3/16" ID X 7/8" OD X .048" (Qty. 3) (242-5059-00) **and** #8-32 Nylon Stop Nut (Qty. 3) (240-5102-00)

PLEASE NOTE:

If reinstalling Item 18, Coil Sleeve, ensure the Sleeve Shoulder is at the Bottom with the Sleeve extending at the Top as shown.

Super VUK Assembly, 500-6184-04-71 (Items 1-11)



Take Note:

* An asterisk (*) indicates item is *Not Shown* in pictorial.

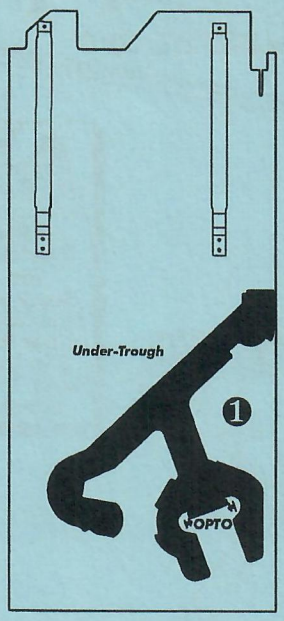
1. Note: The Switch Diode, 1N4001, is not located on this assembly (nor included); it's located on a *Terminal Strip* under the playfield.

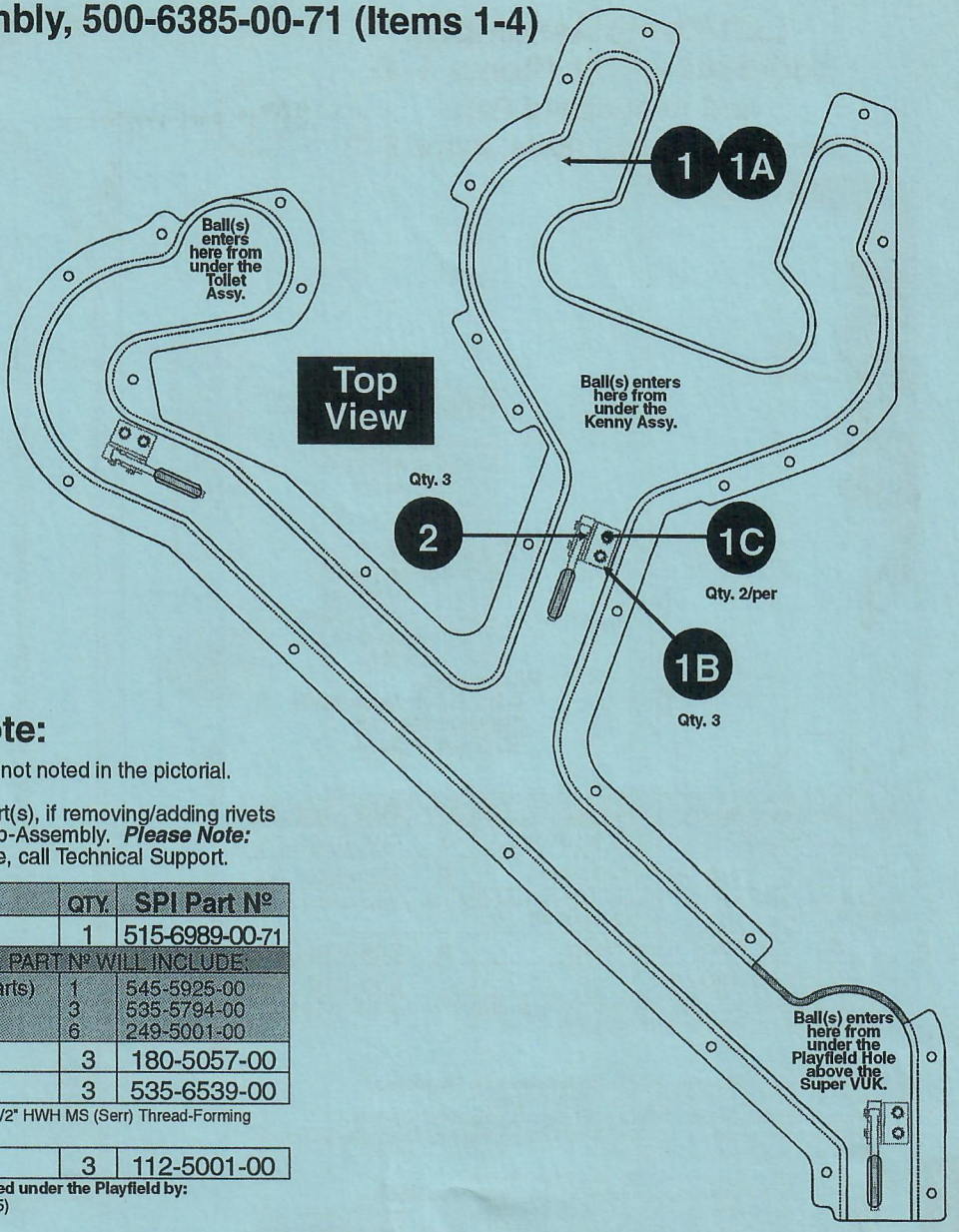
Nº	Individual Part Name	QTY.	SPI Part Nº
1	SVUK Mounting Weldment Bracket	1	515-6744-04
2	Coil Retaining Bracket	1	535-5203-03
	Item 2 is secured by: #8-32 X 1/4" PPH MS (Sems) Zinc (Qty. 2) (232-5300-00)		
3	Coil, 24-940	1	090-5036-00T
ORDERING ABOVE (ITEM 3) COIL PART Nº WILL INCLUDE:			
—	Diode, 1N4004 (positioned at top)	1	112-5003-00
4	Coil Sleeve	1	545-5076-00
5	Spring Washer (17/32" ID X 3/4" X 1")	1	269-5002-00
6	Plunger Assembly	1	515-5941-01

Nº	Individual Part Name	QTY.	SPI Part Nº
7	Compression (Relay) Spring	1	266-5020-00
8	Super VUK Switch Bracket	1	535-8144-01
	Item 8 is secured by: #4-40 X 5/8" MS (Serr) Zinc (Qty. 2) (237-5945-00)		
9	Micro Switch	1	180-5052-00
	Item 9 is secured to Item 8 by: #6-32 X 3/8" HWH Swage (Ser.) Zc. (Qty. 2) (237-5976-02)		
10*	Diode, 1N4001 (On Terminal Strip)	1	112-5001-00
11	Rubber Bumper (Grommet)	1	545-5105-00

Super VUK Assembly, 500-6184-04-71, is secured under the playfield by: #8 X 1/2" HWH AB (Zinc) Blue (Qty. 3) (234-5101-05)

Under-Trough Assembly, 500-6385-00-71 (Items 1-4)





Take Note:

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® "R" indicates item has a riveted-on part(s), if removing/adding rivets is not an option, order the entire ® Sub-Assembly. ***Please Note:*** If the ® Sub-Assembly **Is not** available, call Technical Support.

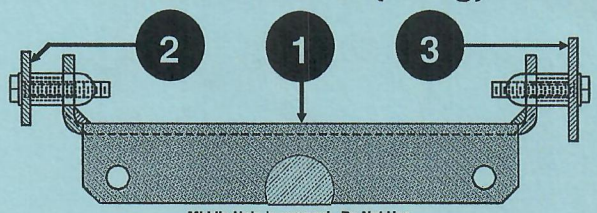
Nº	Individual Part Name	QTY.	SPI Part Nº
1®	Riveted Undertrough Sub-Assy.	1	515-6989-00-71
ORDERING ABOVE ® RIVETED ASSY. PART Nº WILL INCLUDE:			
1A	Red Plastic Trough (Plain, No Parts)	1	545-5925-00
1B	Micro Switch Bracket	3	535-5794-00
1C	Rivet, 1/8" ø X 3/16" Lg. (2/per)	6	249-5001-00
2	Micro Switch (High Form)	3	180-5057-00
3*	Switch Body Protect Plate	3	535-6539-00

Items 2 & 3 are secured on Item 1B by: #2-56 X 1/2" HWH MS (Serr) Thread-Forming 3/16" Hd. (Qty. 2/per) (237-5937-01)

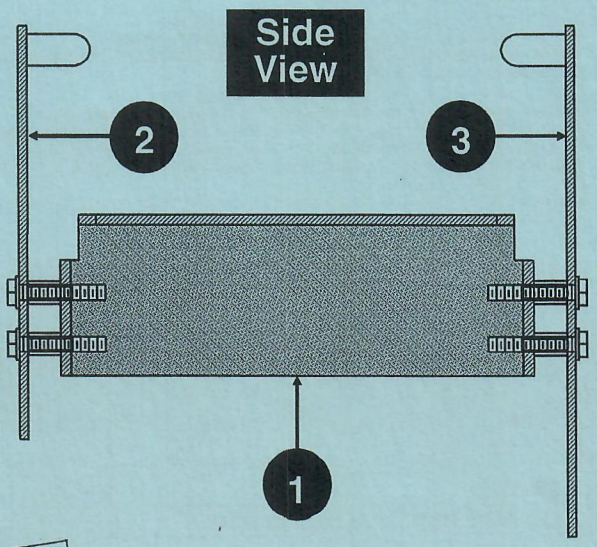
4*	Diode, 1N4001	3	112-5001-00

Under-Trough Assembly, 500-6385-00-71 is secured under the Playfield by:
#8 X 1/2" HWH AB (Zinc) Blue (Qty. 27) (234-5101-05)

OPTO & Bracket (Long) Assembly, 500-6242-02-71 (Items 1-3)



Top View

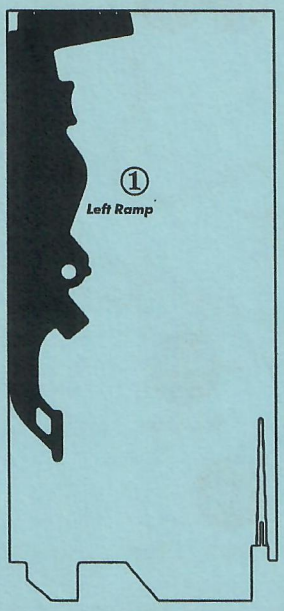


Nº	Individual Part Name	QTY.	SPI Part Nº
1	OPTO Mounting Bracket (Large)	1	515-6768-02
2	OPTO Transmitter (TRANS) Board	1	520-5082-00
3	OPTO Receiver (REC) Board	1	520-5083-01

Items 2 & 3 are secured by: #4-40 X 5/8" HWH (Serr) Zinc (Qty. 2/per) (237-5945-00)

OPTO & Bracket (Long) Assembly, 500-6242-02-71, Is secured under the playfield by:
#8 X 1/2" HWH AB (Zinc) Blue (Qty. 2) (234-5101-05)

Left Ramp Assembly, 500-6389-00-71 (Items 1-4) and Associated Part: (See Below Parts Table, Items 5-7)



Take Note:

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Please Note:
If the ® Sub-Assembly **Is not** available, call Technical Support.

A.P. 5
A.P. 5A
A.P. 7

Nº	Individual Part Name	QTY.	SPI Part Nº
1	Left Plastic Ramp (Plain, No Parts)	1	545-5923-01
2	Single Groove Jewel Post (Clear)	9	550-5034-01

Item 2 secured onto Item 1 by: #6-32 X 1-1/2" PPH MS (Zinc) (Qty. 1/per) (237-5510-00) **and** #6-32 Nylon Stop Nut (Qty. 1/per) (240-5005-00)

3	5/16" I.D. Black Rubber Ring	9	545-5348-02
4	Ramp Exit Protector	1	535-8167-01

Item 4 secured onto Item 1 by: #6-32 X 1/4" PPH MS (Sems) Zinc (Qty. 2) (232-5200-00) **and** #6-32 Nylon Stop Nut (Qty. 2) (240-5005-00)

Left Ramp Assembly, 500-6389-00-71 is secured above the Playfield by:

A▲ 4" X 1/4" Hex Spacer #6-32 Top (Qty. 5) (254-5008-21) **at playfield with** #6-32 X 3/4" Fin Shank Screw (Qty. 1/per) (237-5921-02) **and at the Ramp with** #6-32 X 3/8" PPH MS Sems (Zinc) (Qty. 1/per) (232-5201-00) & #6 Washer (Qty. 1/per) (242-5001-00)

B▲ ▼ 2-3/4" X 1/4" Hex Spacer #6-32 Top (Qty. 3) (254-5008-15) **at the Wood Rail with** Ramp Mntg. Bracket (Qty. 1/per) (515-6508-00) **and at the Ramp with** #6-32 X 3/8" PPH MS Sems (Zinc) (Qty. 1/per) (232-5201-00) & #6 Washer (Qty. 1/per) (242-5001-00); ***with A.P. Item 5 see securing hardware under Item 5.***

C▲ 2-5/8" X 1/4" Hex Spacer #6-32 Top (Qty. 1) (254-5008-08) **at the playfield above the 1-Way Gate (Right Side) with** #6-32 T-Nut (Qty. 1/per) (240-5002-00), Post Fasten #6-32 Top / #6-32 Bottom (Metal Post) (Qty. 1/per) (530-5012-02) **thru** 1-1/16" Single Groove Post (Black Plastic) (Qty. 1/per) (550-5059-00) **and at the Ramp with** #6-32 X 3/8" PPH MS Sems (Zinc) (Qty. 1/per) (232-5201-00) & #6 Washer (Qty. 1/per) (242-5001-00)

D▲ 2-1/2" X 1/4" Hex Spacer #6-32 Top (Qty. 1) (254-5008-16) **at the Wood Rail with** Ramp Mntg. Bracket (Qty. 1) (515-6508-00) **and at the Ramp with** #6-32 X 3/8" PPH MS Sems (Zinc) (Qty. 1) (232-5201-00) & #6 Washer (Qty. 1/per) (242-5001-00)

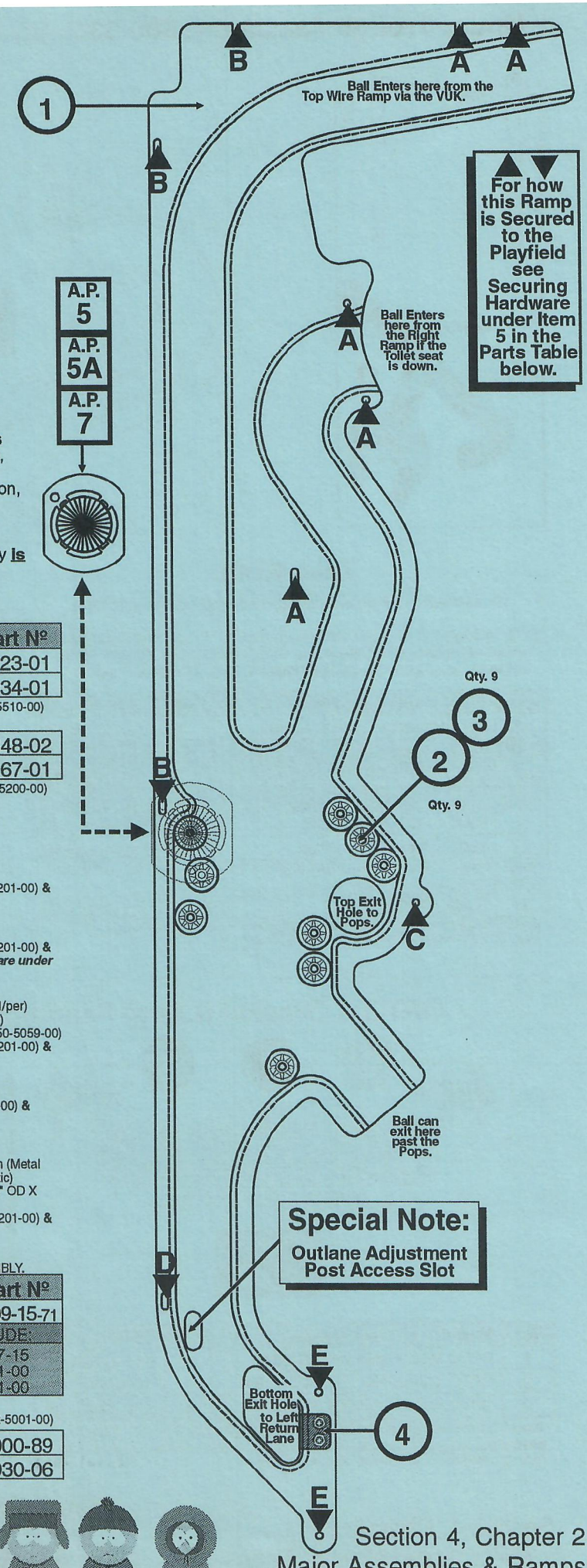
E▼ 2-1/4" X 1/4" Hex Spacer #6-32 Top (Qty. 2) (254-5008-18) **at the playfield through the Left Slingshot Plastic (Butyrate) Piece with** #6-32 T-Nut (Qty. 1/per) (240-5002-00), Post Fasten #6-32 Top / #6-32 Bottom (Metal Post) (Qty. 1/per) (530-5012-02) **thru** 1-1/16" Single Groove Post (Black Plastic) (Qty. 1/per) (550-5059-00); Slingshot Plastic Protect Washer (.187" ID X .875" OD X .048" Thk.) (Qty. 1) (242-5059-00) **and at the Ramp with** #6-32 X 3/8" PPH MS Sems (Zinc) (Qty. 1/per) (232-5201-00) & #6 Washer (Qty. 1/per) (242-5001-00)

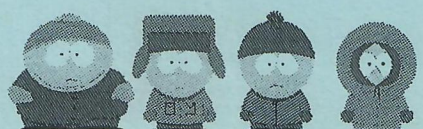
ASSOCIATED PARTS **ARE NOT INCLUDED** WITH THE ABOVE ASSEMBLY.

Nº	Associated Part Name	QTY.	SPI Part Nº
5®	Riveted Plastic Piece (Buty.) Assy.	1	515-7009-15-71
ORDERING ABOVE ® RIVETED ASSY. PART Nº WILL INCLUDE:			
5A	Screened (Yellow) Plastic Piece -15	1	830-5967-15
5B*	2-Lug Stand-Up Short Socket	1	077-5101-00
5C*	Rivet, 1/8" ø X 3/16" Long	1	249-5001-00

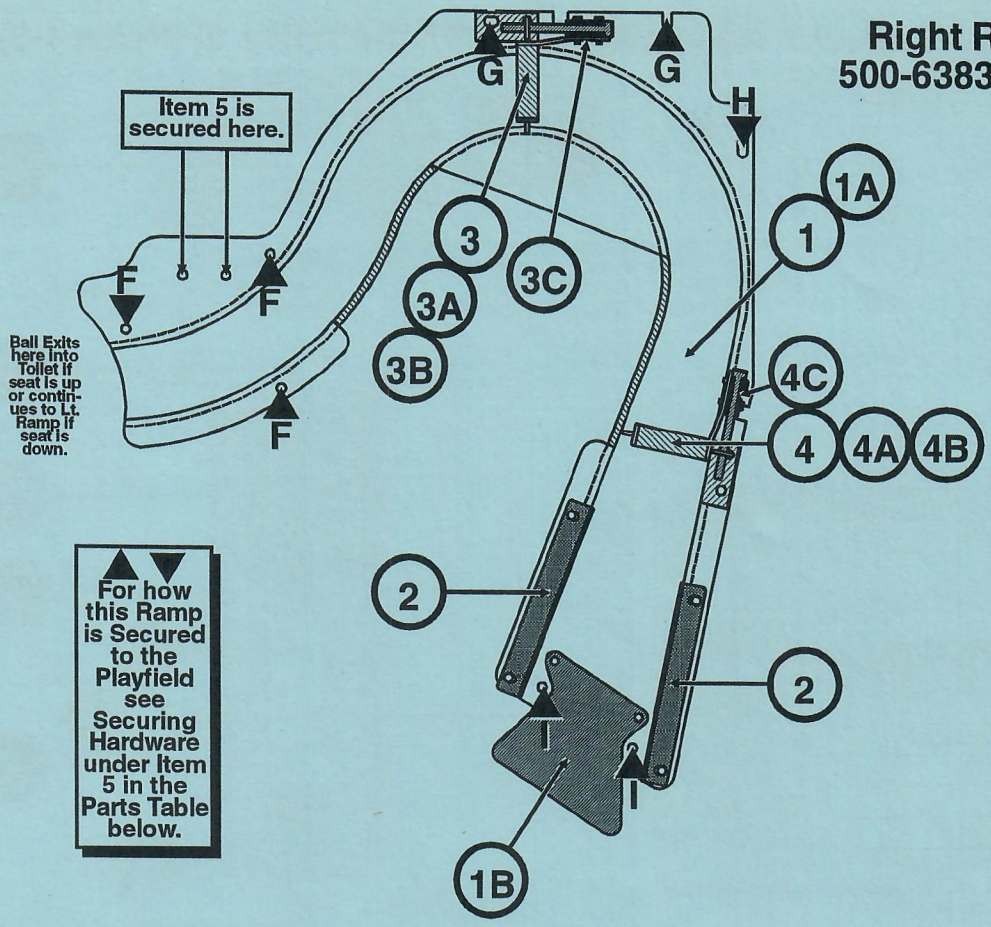
A.P. Item 5 secured on Item 1 by: 1" X 3/8" Spacer Gray (Qty. 1) (254-5000-04), #6-32 X 1-1/2" PPH MS (Zinc) (Qty. 1) (237-5510-00) **and** #6 Washer (Qty. 1) (242-5001-00)

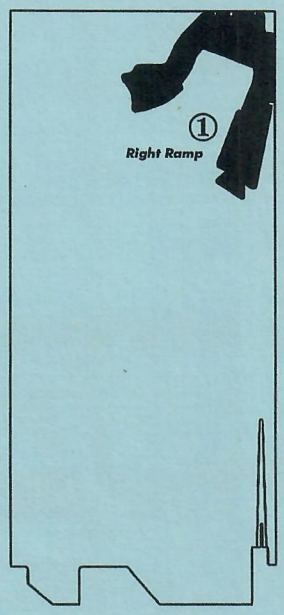
6*	#89 Bulb	1	165-5000-89
7	Mini-Mars Light Cover Snap-In Yellow	1	550-5030-06





Right Ramp Assembly, 500-6383-00-71 (Items 1-5)





Take Note:

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Nº	Individual Part Name	QTY.	SPI Part Nº
1®	Riveted Right Ramp Sub-Assy.	1	515-6988-00-71
ORDERING ABOVE ® RIVETED ASSY. PART Nº WILL INCLUDE:			
1A	Right Plastic Ramp (Plain, No Parts)	1	545-5923-00
1B	Ramp Flap	1	535-8373-00
1C*	Rivet, 1/8" ø X 3/16" Lg.	2	249-5001-00
1D*	Washer, 9/64" ID X 5/16" OD X 1/32"	2	242-5017-00
2	Ramp Entrance Protector	2	535-6707-01

Item 2 secured onto Item 1 by: #6-32 X 3/8" PPH MS (Sems) Zinc (Qty. 2/per) (232-5201-00) **and** #6-32 Nylon Stop Nut (Qty. 2/per) (240-5005-00)

3	Gate Assembly (Exit)	1	515-6490-00
ORDERING ABOVE (ITEM 3) SUB-ASSY. PART Nº WILL INCLUDE:			
3A	Gate Mounting Bracket	1	535-7613-01
3B	Wire Form	1	535-6304-03
3C	Micro Switch for Wire Gate	1	180-5087-00
3D*	Diode, 1N4001	1	112-5001-00
3E*	#2-56 X 3/8" HWH MS (Serr.) TF 3/16" Hd.	2	237-5938-01

Item 3E secures Item 3C onto 3A.
Item 3 (closest to switch) secured onto Item 1 by: #6-32 X 1/4" PPH MS (Sems) Zinc (Qty. 1) (232-5200-00), #6-32 Nylon Stop Nut (Qty. 1) (240-5005-00) **and (farthest from switch) secured by (see ▲F following Item 5)**

4	Gate & Sign Assembly (Enter)	1	515-6774-04-71
ORDERING ABOVE (ITEM 4) SUB-ASSY. PART Nº WILL INCLUDE:			
4A	Gate & Sign Mounting Bracket	1	535-6303-03
4B	Wire Form	1	535-6304-03
4C	Micro Switch for Wire Gate	1	180-5087-00
4D	Diode, 1N4001	1	112-5001-00
4E*	Wdg. Base Offset Socket (Step-Brkt.)	2	077-5029-00
4F*	#555 Wedge Base Bulb	2	165-5002-00
4G*	Rubber Lite Cover Yellow	1	545-5014-06

Item 4 continued in the next column...

Item 4 continued from previous column...

4H*	Rubber Lite Cover Orange	1	545-5014-07
4I*	Plastic (Butyrate) Mr. Hankey Sign -16	1	830-5967-16
4J‡*	Plastic (Butyrate) Alternate Sign -17	1	830-5967-17
4K*	#2-56 X 3/8" HWH MS (Serr.) TF 3/16" Hd.	2	237-5938-01
4L*	#4-40 X 3/8" PPH TF	1	237-5979-00
4M*	#4-40 Nylon Stop Nut	1	240-5303-00
4N*	#6 X 3/8" HWH AB Zinc	2	234-5000-00

Item 4 secured onto Item 1 by: #6-32 X 1/4" PPH MS (Sems) Zinc (Qty. 2) (232-5200-00) **and** #6-32 Nylon Stop Nut (Qty. 2) (240-5005-00)
Item 4K secures Item 4C onto Item 4A.
Items 4L & 4M secures Item 4E to Item 4I or 4J.
Item 4N secures Item 4I or 4J to Item 4A.
‡ Item 4J only for use if Item 4I is offensive to owner (See Parts Bag in your Game).

5*	South Park Chef (3" Figurine)	1	880-5028-00

Item 5 secured onto Item 1 by: #8 X 1/2" HWH AB (Zinc) Blue (Qty. 2) (234-5101-05)

Right Ramp Assembly, 500-6383-00-71 Is secured above the playfield by:

F▲ ▼ 4-1/4" X 1/4" Hex Spacer #6-32 Top (Qty. 3) (254-5008-30)
at playfield with #6-32 X 3/4" Fin Shank Screw (Qty. 1/per) (237-5921-02)
and at the Ramp with #6-32 X 3/8" PPH MS Sems (Zinc) (Qty. 1/per) (232-5201-00) & #6 Washer (Qty. 1/per) (242-5001-00)

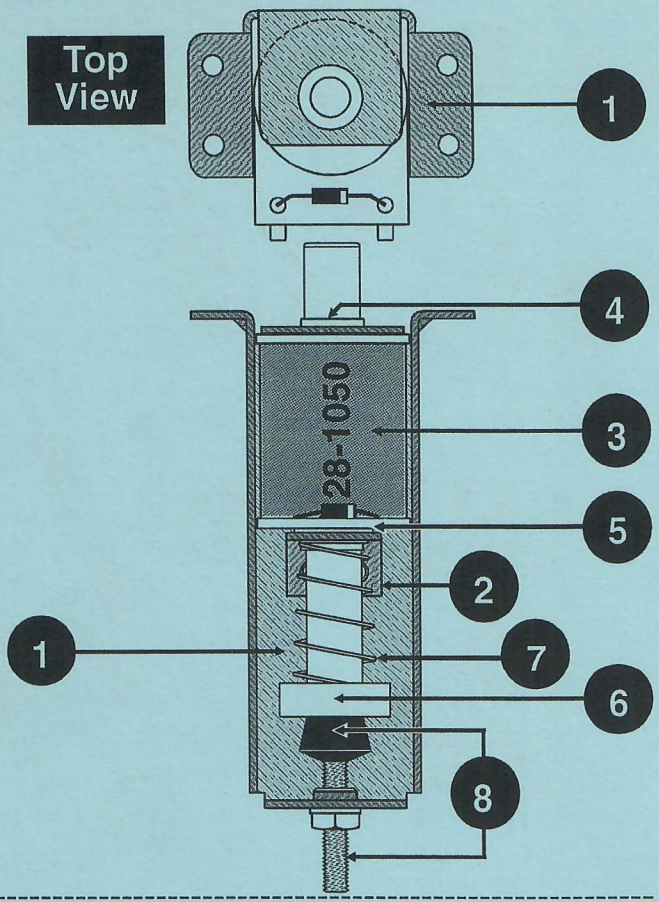
G▲ 3" X 1/4" Hex Spacer #6-32 Top (Qty. 2) (254-5008-14)
at the Wood Rail with Ramp Mntg. Bracket (Qty. 1/per) (515-6508-00)
and at the Ramp with #6-32 X 3/8" PPH MS Sems (Zinc) (Qty. 1/per) (232-5201-00) & #6 Washer (Qty. 1/per) (242-5001-00)

H▼ 2-5/8" X 1/4" Hex Spacer #6-32 Top (Qty. 2) (254-5008-06)
at the Wood Rail with Ramp Mntg. Bracket (Qty. 1/per) (515-6508-00)
and at the Ramp with #6-32 X 3/8" PPH MS Sems (Zinc) (Qty. 1/per) (232-5201-00) & #6 Washer (Qty. 1/per) (242-5001-00)

I▲ #4 X 5/8" PFH (Black) Screw (Qty. 2/per) (237-5833-00) **by the Ramp Flap.**

Lt. & Rt. Outlane Ball Deflector Assemblies, 500-5788-03 (Qty. 2) (Items 1-8)

UK ONLY OPTIONAL



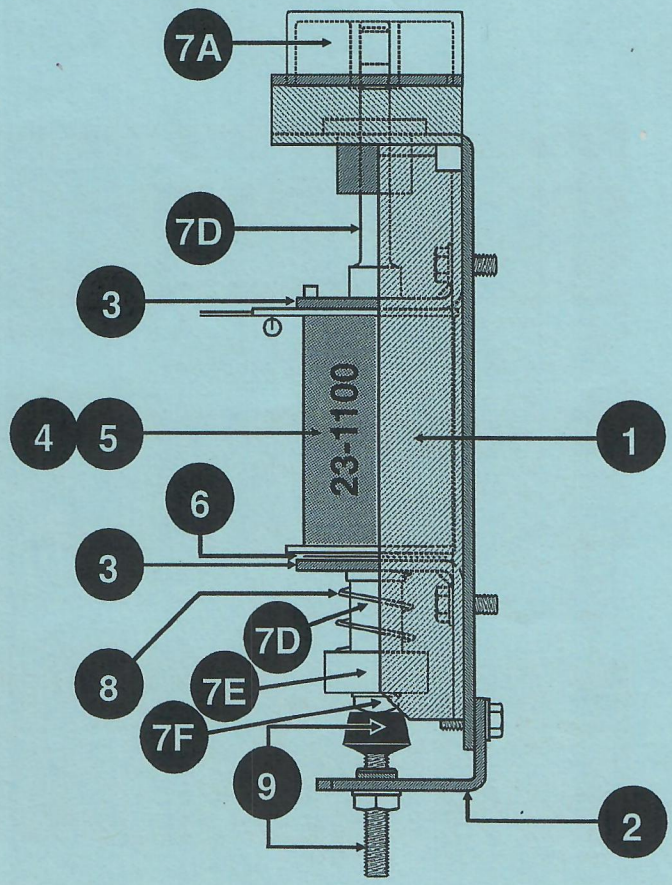
Nº	Individual Part Name	QTY.	SPI Part Nº
1	Ball Deflector Coil Mounting Bracket	1	535-6857-02
2	Coil Retaining Bracket	1	535-5203-03
	Item 2 is secured by: #8-32 X 1/4" PPH MS (Sems) Zinc (Qty. 2) (232-5300-00)		
3	Coil, 28-1050	1	090-5046-00
	ORDERING ABOVE (ITEM 3) COIL PART Nº WILL INCLUDE:		
—	Diode, 1N4004 (positioned at top)	1	112-5003-00
4	Coil Sleeve	1	545-5076-00
5	Spring Washer (17/32" ID X 3/4" X 1")	1	269-5002-00
6	Solid Plunger Assembly	1	515-6858-00
7	Compression (Relay) Spring	1	266-5022-01
8	#10-32 Adj. Spindle Stop w/Rubber Tip	1	280-5014-00

Item 8 is secured by: #10-32 Keps Nut (Qty. 1) (240-5208-00)

Left & Right Ball Deflector Assemblies, 500-5788-03 is secured under the playfield by:
#8-32 X 1/2" HWH AB (Zinc) Blue (Qty. 4/per) (234-5101-05)

Up / Down Post Assembly, 500-6293-00 (Items 1-9)

UK ONLY OPTIONAL



Take Note:

Item 5D, part of Item 5, Plunger & Shaft Sub-Assembly, is 1 piece and cannot be ordered separated.

Nº	Individual Part Name	QTY.	SPI Part Nº
1	Up/Down Post Coil Mounting Bracket	1	515-6840-00
2	Adjustment Spindle Stop Bracket	1	535-8303-00
3	Coil Retaining Bracket	2	535-7356-00
	Items 2 & 3 are secured by: #8-32 X 3/8" Swage (Serr) Zinc (Qty. 2/per) (237-5975-00)		
4	Coil, 23-1100 (ORG)	1	090-5030-00T
	ORDERING ABOVE (ITEM 4) COIL PART Nº WILL INCLUDE:		
—	Diode, 1N4004 (positioned at top)	1	112-5003-00
5	Coil Sleeve (with extension)	1	545-5847-00
6	Spring Washer, 17/32" ID X 3/4" X 1"	1	269-5002-00
7	Plunger & Shaft Assembly	1	515-6844-00-35
	ORDERING ABOVE (ITEM 7) SUB-ASSY. PART Nº WILL INCLUDE:		
7A	Ball Bumper Plastic (Top) Red	1	550-5029-02
7B*	Roll Pin, 3/32" ø X 1/2" Long	1	251-5002-00
7C*	Retaining Ring, 1/4" ø Shaft	1	270-5002-00
7D	Plunger & Shaft Sub-Assembly	1	515-6841-00
7E	Plunger Head	1	530-5511-00
7F	#10-32 X 3/8" PPH MS (Sems) Zinc	1	232-5401-00
8	Compression (Relay) Spring	1	266-5022-01
9	#10-32 Adj. Spindle Stop w/Rubber Tip	1	280-5014-00

Item 9 is secured by: #10-32 Keps Nut (Qty. 1) (240-5208-00)

Up/Down Post Assembly, 500-6293-00 is secured under the playfield by:
#8-32 X 1/2" HWH AB (Zinc) Blue (Qty. 6) (234-5101-05)

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Use the below ***Coils Detailed Chart Table*** in conjunction with Sec. 5, Chp. 1, Backbox Board Layout Wiring Diagram and Backbox I/O Power Driver Board Detailed Wiring Diagram (I/O Board Connectors J6, J7, J8 & J9):

COILS DETAILED CHART TABLE

	High Current Coils Group 1	Drive Transistor (D.T.)	Driver Ouput Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connnection	Power Voltage	Coil GA/Turn or Bulb Type
#1	TROUGH UP-KICKER	Q1	I/O Pwr. Drvr.	BRN-BLK	J8-P1	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#2	AUTO LAUNCH	Q2	I/O Pwr. Drvr.	BRN-RED	J8-P3	YEL-VIO	J10-P4/5	50v DC	24-940 090-5036-00T
#3	SUPER VUK	Q3	I/O Pwr. Drvr.	BRN-ORG	J8-P4	YEL-VIO	J10-P4/5	50v DC	24-940 090-5036-00T
#4	TOP VUK	Q4	I/O Pwr. Drvr.	BRY-YEL	J8-P5	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#5	TOILET SEAT LID	Q5	I/O Pwr. Drvr.	BRN-GRN	J8-P6	BRN	J7-P1	20v DC	23-1100 090-5030-00T
#6	MR. HANKEY LATCH	Q6	I/O Pwr. Drvr.	BRN-BLU	J8-P7	YEL-VIO	J10-P4/5	50v DC	29-1000 090-5059-00
#7	FLASH POPS *4	Q7	I/O Pwr. Drvr.	BRN-VIO	J8-P8	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#8	EUROPEAN TOKEN DISPENSER	Q8	I/O Pwr. Drvr.	BRN-GRY	J8-P9	YEL-VIO	J10-P4/5	50v DC	DL4SS 515-6076-01

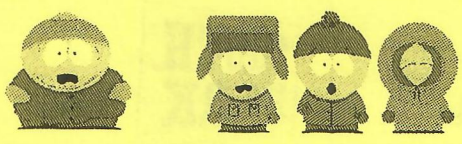
	High Current Coils Group 2	Drive Transistor (D.T.)	Driver Ouput Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connnection	Power Voltage	Coil GA/Turn
#9	LEFT TURBO BUMPER	Q9	I/O Pwr. Drvr.	BLU-BRN	J9-P1	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#10	RIGHT TURBO BUMPER	Q10	I/O Pwr. Drvr.	BLU-RED	J9-P2	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#11	BOTTOM TURBO BUMPER	Q11	I/O Pwr. Drvr.	BLU-ORG	J9-P4	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#12	LEFT SLINGSHOT	Q12	I/O Pwr. Drvr.	BLU-YEL	J9-P5	BRN	J7-P1	20v DC	23-800 090-5001-00T
#13	MR. HANKEY (DOWN)	Q13	I/O Pwr. Drvr.	BLU-GRN	J9-P6	YEL-VIO	J10-P4/5	50v DC	23-1100 090-5030-00T
#14	KENNY PIVOT (DEAD)	Q14	I/O Pwr. Drvr.	BLU-BLK	J9-P7	YEL-VIO	J10-P4/5	50v DC	22-1080 090-5032-00T
#15	LEFT FLIPPER (50v RED/YEL)	Q15	I/O Pwr. Drvr.	ORG-GRY	J9-P8	RED-YEL GRY-YEL	J10-P1/2	50v DC	23-1100 090-5030-00T
#16	RIGHT FLIPPER (50v RED/YEL)	Q16	I/O Pwr. Drvr.	ORG-VIO	J9-P9	RED-YEL BLU-YEL	J10-P1/2	50v DC	23-1100 090-5030-00T

	Low Current Coils Group 1	Drive Transistor (D.T.)	Driver Ouput Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connnection	Power Voltage	Coil GA/Turn Bulb or Meter
#17	RIGHT SLINGSHOT	Q17	I/O Pwr. Drvr.	VIO-BRN	J7-P2	BRN	J7-P1	20v DC	23-800 090-5001-00T
#18	FLASH TOP VUK *1	Q18	I/O Pwr. Drvr.	VIO-RED	J7-P3	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#19	KENNY LT	Q19	I/O Pwr. Drvr.	VIO-ORG	J7-P4	BRN	J7-P1	20v DC	24-940 090-5036-00T
#20	KENNY RT	Q20	I/O Pwr. Drvr.	VIO-YEL	J7-P6	BRN	J7-P1	20v DC	24-940 090-5036-00T
#21	LT OUTLANE (UK ONLY)	Q21	I/O Pwr. Drvr.	VIO-GRN	J7-P7	BRN	J7-P1	20v DC	28-1050 090-5046-00
#22	RT OUTLANE (UK ONLY)	Q22	I/O Pwr. Drvr.	VIO-BLU	J7-P8	BRN	J7-P1	20v DC	28-1050 090-5046-00
#23	UP/DOWN POST (UK ONLY)	Q23	I/O Pwr. Drvr.	VIO-BLK	J7-P9	BRN	J7-P1	20v DC	23-1100 090-5030-00T
#24	OPTIONAL COIN METER	Q24	I/O Pwr. Drvr.	VIO-GRY	J7-P10	RED	J16-P7	5v DC	Meter 5v 091-5000-00

D iode O n T erminal S trip (if noted)

	Flash Lamps (FLASH)	Drive Transistor (D.T.)	Driver Ouput Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connnection	Power Voltage	Bulb Type
#F1	FLASH STAN *2	Q25	I/O Pwr. Drvr.	BLK-BRN	J6-P1	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#F2	FLASH CHEF *2	Q26	I/O Pwr. Drvr.	BLK-RED	J6-P2	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#F3	FLASH KENNY *2	Q27	I/O Pwr. Drvr.	BLK-ORG	J6-P3	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#F4	FLASH KYLE *2	Q28	I/O Pwr. Drvr.	BLK-YEL	J6-P4	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#F5	FLASH CARTMAN *2	Q29	I/O Pwr. Drvr.	BLK-GRN	J6-P5	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#F6	FLASH KENNY *1 BACK *2	Q30	I/O Pwr. Drvr.	BLK-BLU	J6-P6	ORG	J6-P10	20v DC	#906 Bulb 165-5004-00 #89 Bulb 165-5000-89
#F7	FLASH MR HANKEY/TOILET *2	Q31	I/O Pwr. Drvr.	BLK-VIO	J6-P7	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#F8	FLASH SUPER VUK *1	Q32	I/O Pwr. Drvr.	BLK-GRY	J6-P8	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89

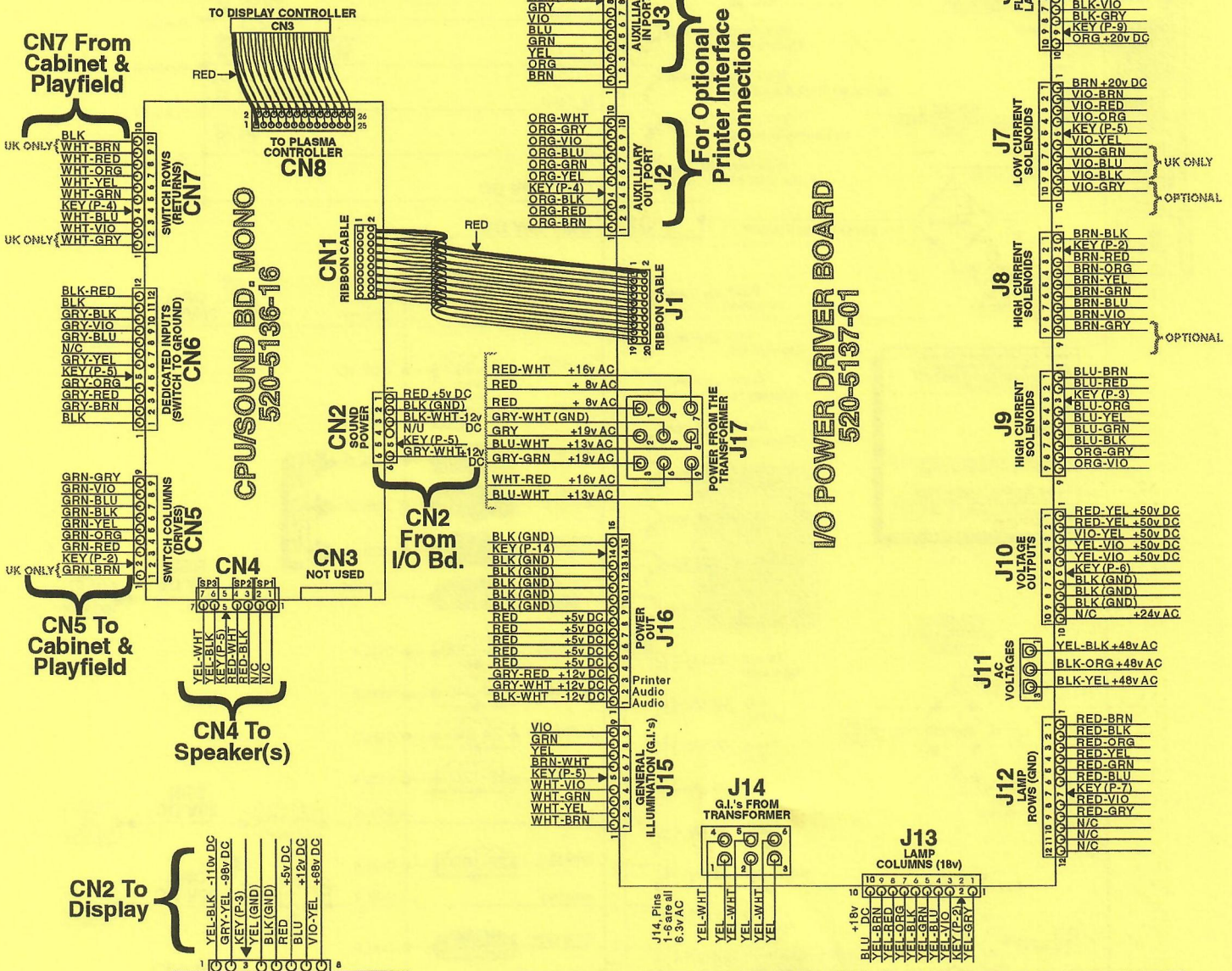
Note: In Test Flash Lamps Menu ("Flash" Icon), Flashers tested are Flash Lamps F1-F8 ONLY. Test all others in Single or Cycling Coil Tests.



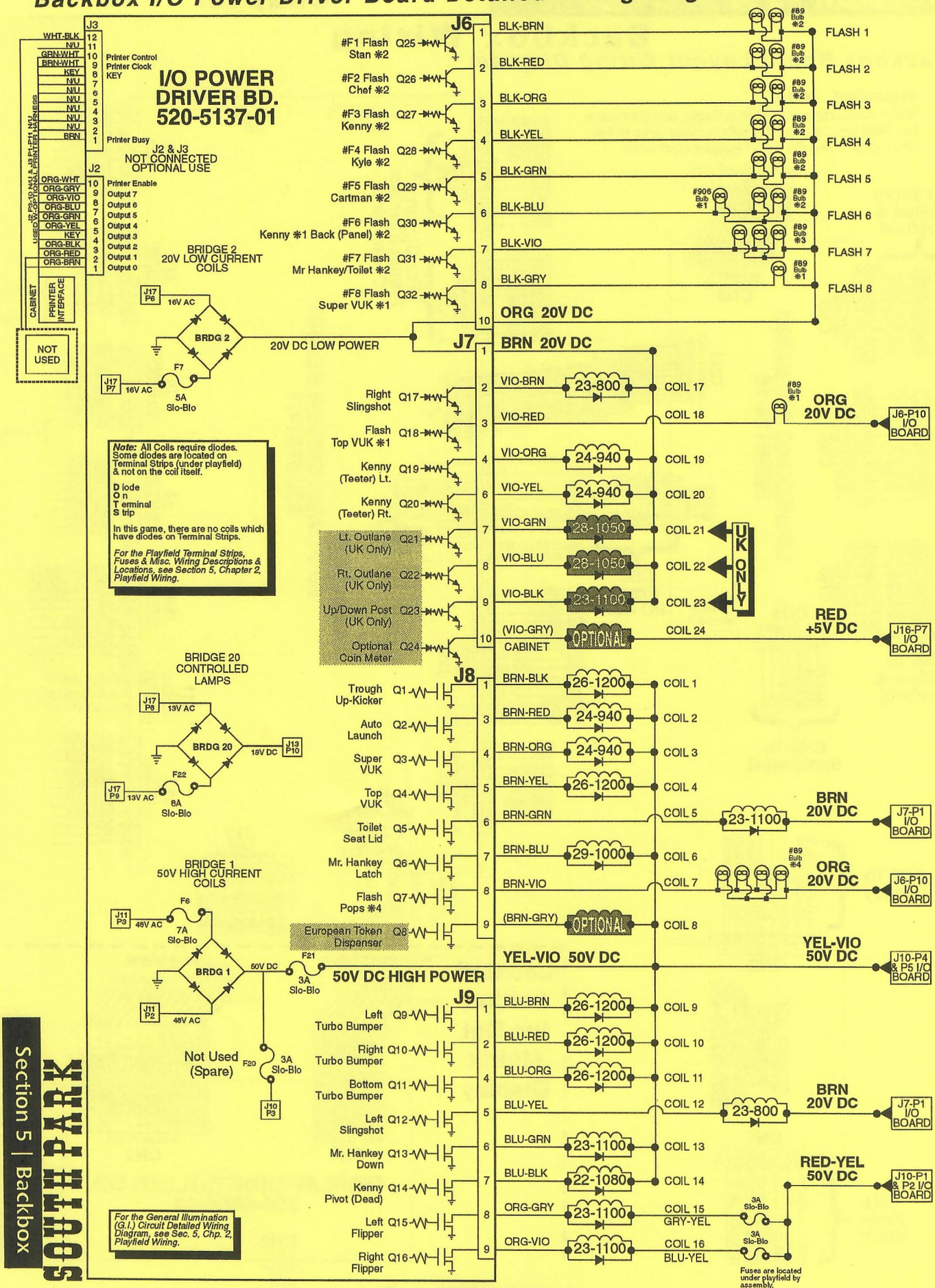
Backbox Wiring

Backbox Board Layout Wiring Diagram

Important Note:
When connecting any Ribbon Cable, always ensure the "Red Line" side of the ribbon cable goes to the Pin-1 side of any Dual 0.1" Header Connector.

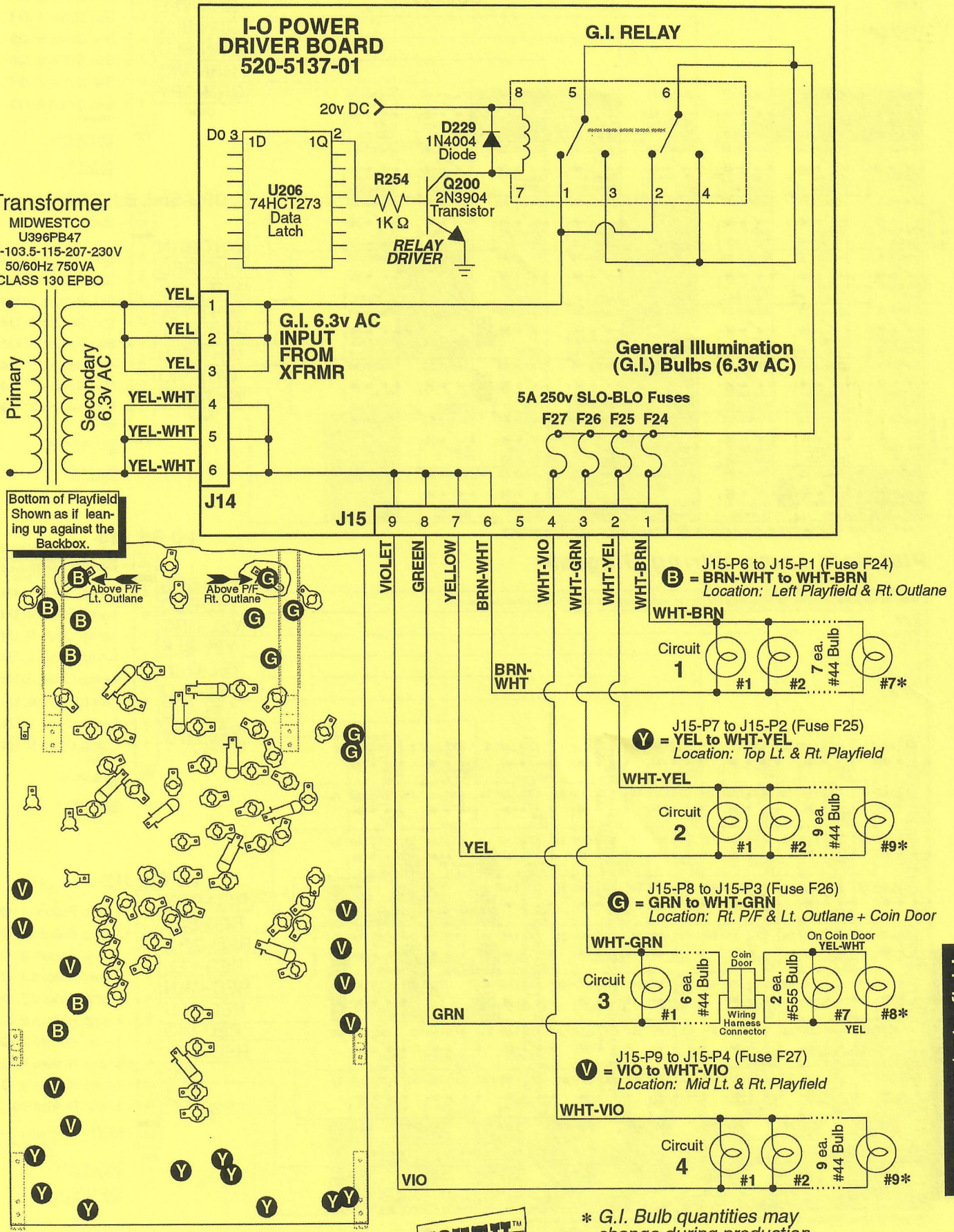


Backbox I/O Power Driver Board Detailed Wiring Diagram



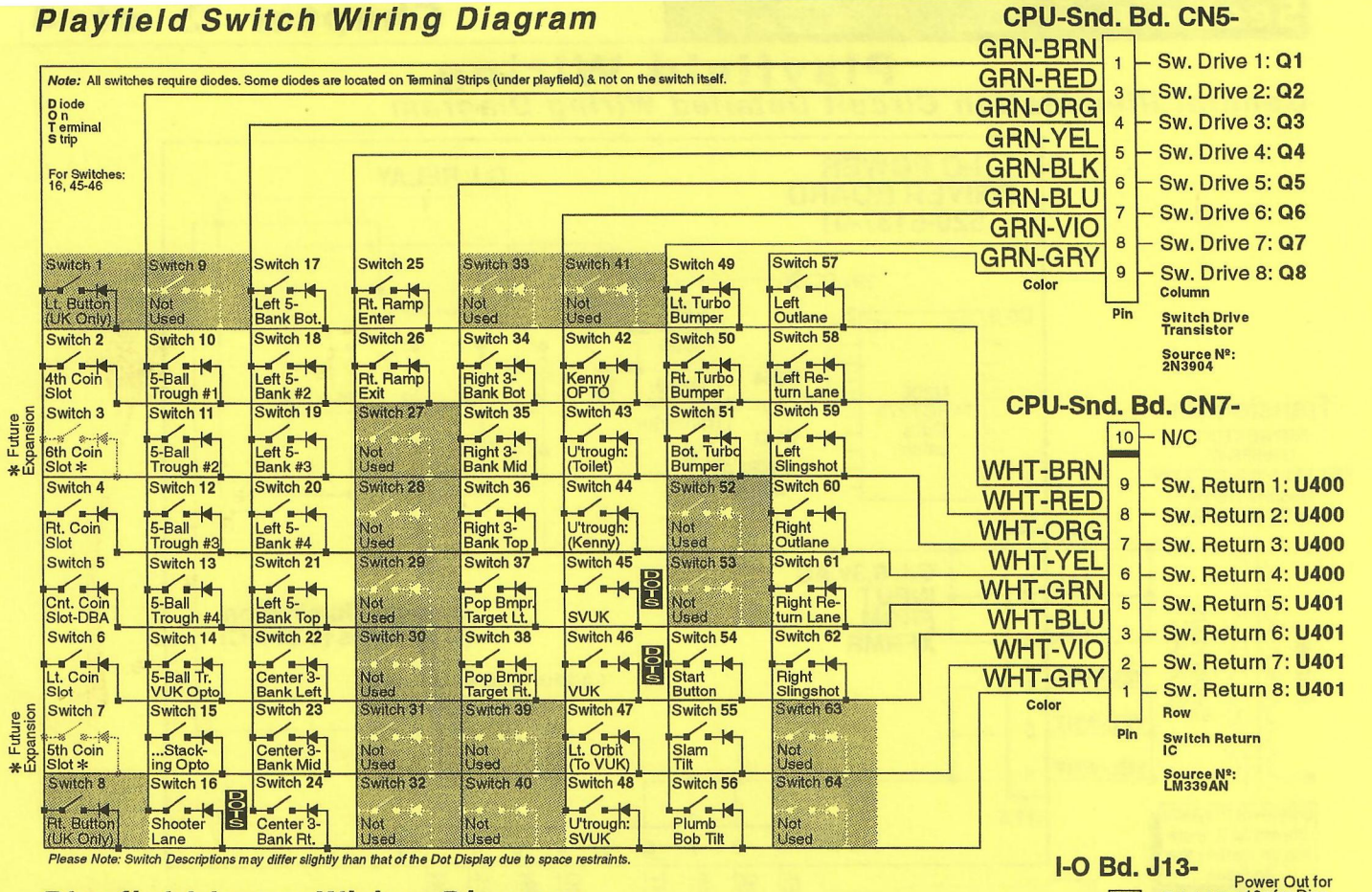
Playfield Wiring

General Illumination Circuit Detailed Wiring Diagram

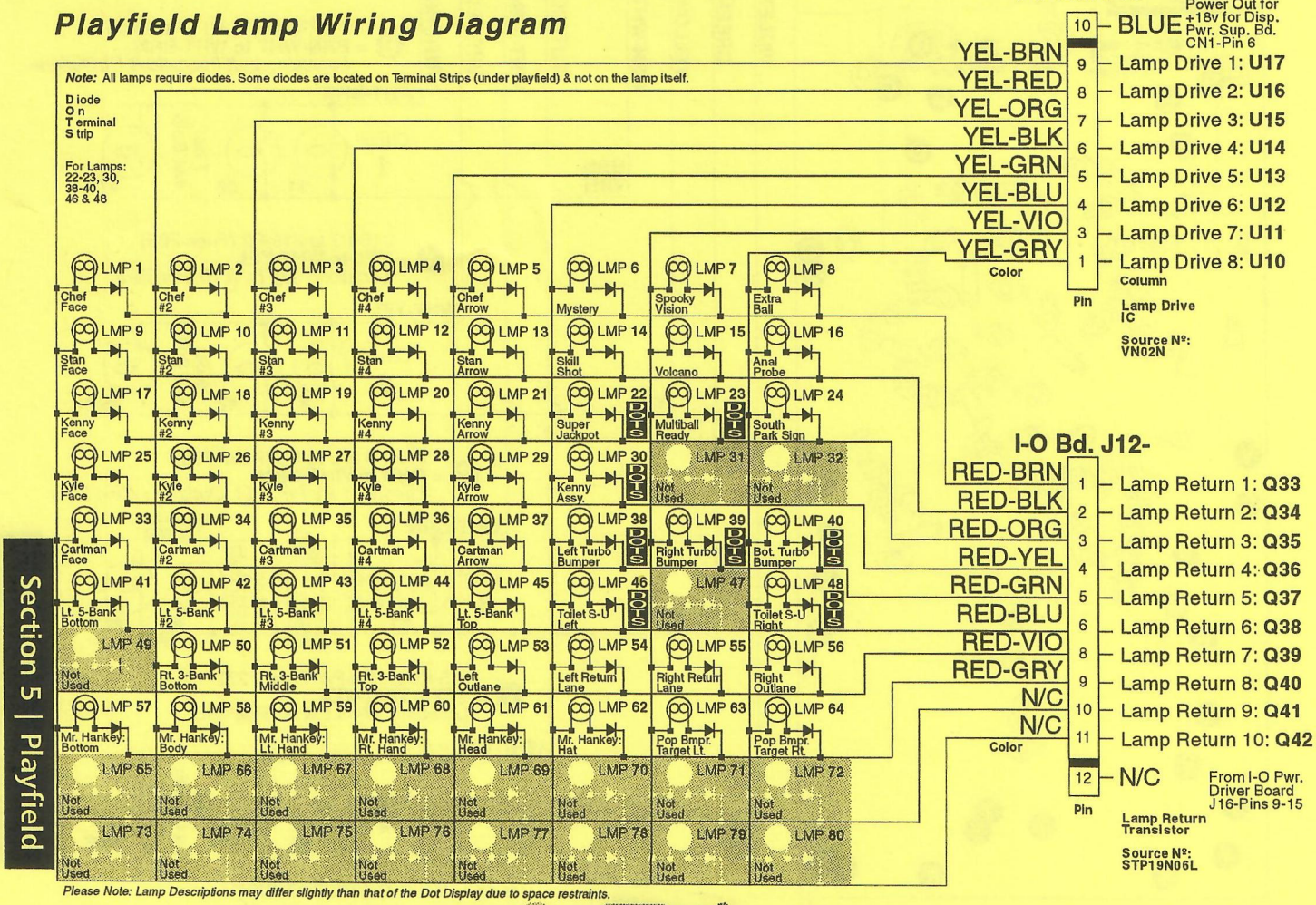


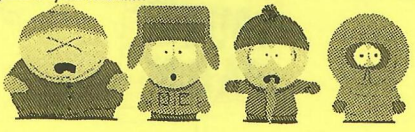
* *G.I. Bulb quantities may change during production.*

Playfield Switch Wiring Diagram


Note: All switches require diodes. Some diodes are located on Terminal Strips (under playfield) & not on the switch itself.
Diode On Terminal Strip
For Switches: 16, 45-46
Switch 1 Lt. Button (UK Only)
Switch 2 4th Coin Slot
Switch 3 6th Coin Slot *
Switch 4 Rt. Coin Slot
Switch 5 Cnt. Coin Slot-DBA
Switch 6 Lt. Coin Slot
Switch 7 5th Coin Slot *
Switch 8 Rt. Button (UK Only)
Switch 9 Not Used
Switch 10 5-Ball Trough #1
Switch 11 5-Ball Trough #2
Switch 12 5-Ball Trough #3
Switch 13 5-Ball Trough #4
Switch 14 5-Ball Tr. VUK Opto
Switch 15 ...Stacking Opto
Switch 16 Shooter Lane
Switch 17 Left 5-Bank Bot.
Switch 18 Left 5-Bank #2
Switch 19 Left 5-Bank #3
Switch 20 Left 5-Bank #4
Switch 21 Left 5-Bank Top
Switch 22 Center 3-Bank Left
Switch 23 Center 3-Bank Mid
Switch 24 Center 3-Bank Rt.
Switch 25 Rt. Ramp Enter
Switch 26 Rt. Ramp Exit
Switch 27 Not Used
Switch 28 Not Used
Switch 29 Not Used
Switch 30 Not Used
Switch 31 Not Used
Switch 32 Not Used
Switch 33 Not Used
Switch 34 Right 3-Bank Bot
Switch 35 Right 3-Bank Mid
Switch 36 Right 3-Bank Top
Switch 37 Pop Bmpr. Target Lt.
Switch 38 Pop Bmpr. Target Rt.
Switch 39 Not Used
Switch 40 Not Used
Switch 41 Not Used
Switch 42 Kenny OPTO
Switch 43 U'trough: (Toilet)
Switch 44 U'trough: (Kenny)
Switch 45 SVUK
Switch 46 VUK
Switch 47 Lt. Orbit (To VUK)
Switch 48 U'trough: SVUK
Switch 49 Lt. Turbo Bumper
Switch 50 Rt. Turbo Bumper
Switch 51 Bot. Turbo Bumper
Switch 52 Not Used
Switch 53 Not Used
Switch 54 Start Button
Switch 55 Slam Tilt
Switch 56 Plumb Bob Tilt
Switch 57 Left Outlane
Switch 58 Left Return Lane
Switch 59 Left Slingshot
Switch 60 Right Outlane
Switch 61 Right Return Lane
Switch 62 Right Slingshot
Switch 63 Not Used
Switch 64 Not Used
DOTS
* Future Expansion
* Future Expansion
Please Note: Switch Descriptions may differ slightly than that of the Dot Display due to space restraints.
CPU-Snd. Bd. CN5-
GRN-BRN 1 Sw. Drive 1: Q1
GRN-RED 3 Sw. Drive 2: Q2
GRN-ORG 4 Sw. Drive 3: Q3
GRN-YEL 5 Sw. Drive 4: Q4
GRN-BLK 6 Sw. Drive 5: Q5
GRN-BLU 7 Sw. Drive 6: Q6
GRN-VIO 8 Sw. Drive 7: Q7
GRN-GRY 9 Sw. Drive 8: Q8
Color
Pin
Column
Switch Drive Transistor
Source Nº: 2N3904
CPU-Snd. Bd. CN7-
10 N/C
WHT-BRN 9 Sw. Return 1: U400
WHT-RED 8 Sw. Return 2: U400
WHT-ORG 7 Sw. Return 3: U400
WHT-YEL 6 Sw. Return 4: U400
WHT-GRN 5 Sw. Return 5: U401
WHT-BLU 3 Sw. Return 6: U401
WHT-VIO 2 Sw. Return 7: U401
WHT-GRY 1 Sw. Return 8: U401
Color
Pin
Row
Switch Return IC
Source Nº: LM339AN

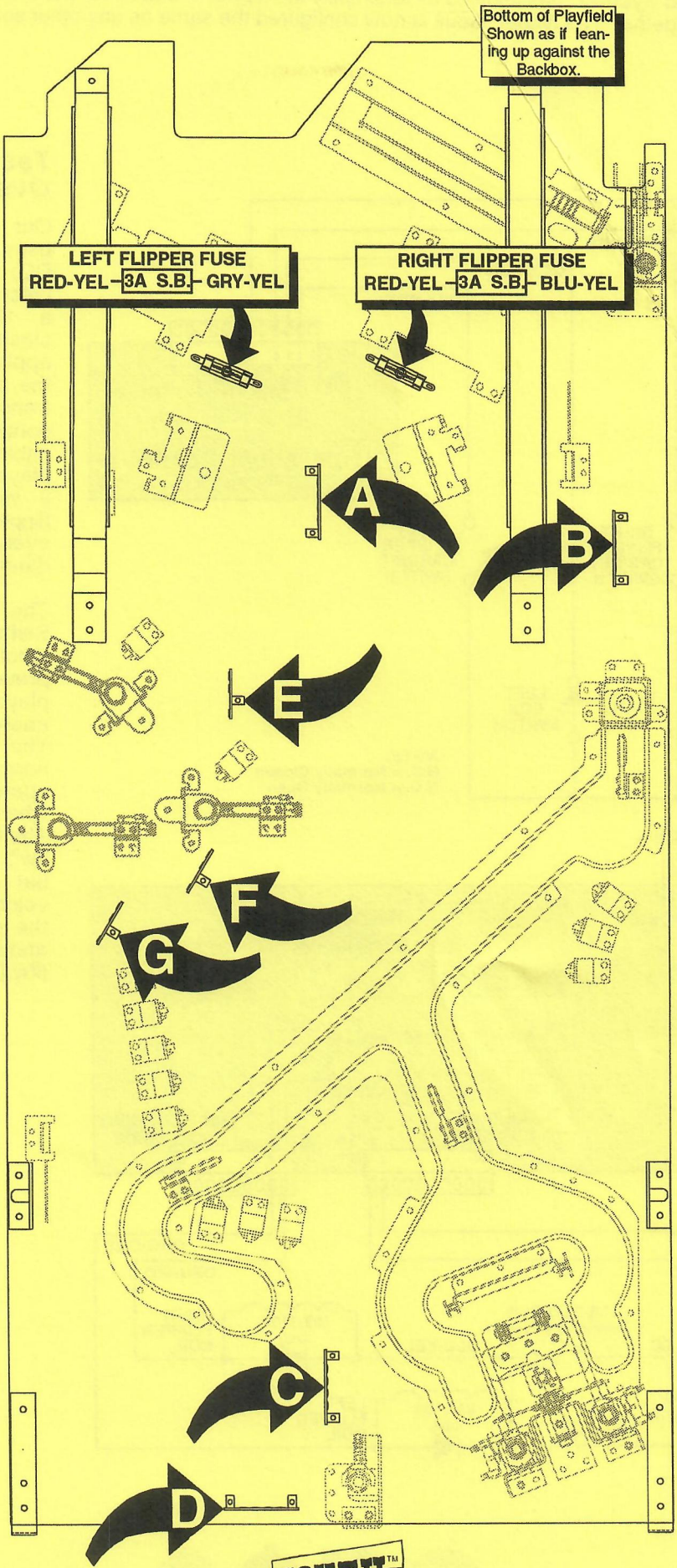
Playfield Lamp Wiring Diagram


Note: All lamps require diodes. Some diodes are located on Terminal Strips (under playfield) & not on the lamp itself.
Diode On Terminal Strip
For Lamps: 22-23, 30, 38-40, 46 & 48
LMP 1 Chef Face
LMP 2 Chef #2
LMP 3 Chef #3
LMP 4 Chef #4
LMP 5 Chef Arrow
LMP 6 Mystery
LMP 7 Spooky Vision
LMP 8 Extra Ball
LMP 9 Stan Face
LMP 10 Stan #2
LMP 11 Stan #3
LMP 12 Stan #4
LMP 13 Stan Arrow
LMP 14 Skill Shot
LMP 15 Volcano
LMP 16 Anal Probe
LMP 17 Kenny Face
LMP 18 Kenny #2
LMP 19 Kenny #3
LMP 20 Kenny #4
LMP 21 Kenny Arrow
LMP 22 Super Jackpot
LMP 23 Multiball Ready
LMP 24 South Park Sign
LMP 25 Kyle Face
LMP 26 Kyle #2
LMP 27 Kyle #3
LMP 28 Kyle #4
LMP 29 Kyle Arrow
LMP 30 Kenny Assy.
LMP 31 Not Used
LMP 32 Not Used
LMP 33 Cartman Face
LMP 34 Cartman #2
LMP 35 Cartman #3
LMP 36 Cartman #4
LMP 37 Cartman Arrow
LMP 38 Left Turbo Bumper
LMP 39 Right Turbo Bumper
LMP 40 Bot. Turbo Bumper
LMP 41 Lt. 5-Bank Bottom
LMP 42 Lt. 5-Bank #2
LMP 43 Lt. 5-Bank #3
LMP 44 Lt. 5-Bank #4
LMP 45 Lt. 5-Bank Top
LMP 46 Toilet S-U Left
LMP 47 Not Used
LMP 48 Toilet S-U Right
LMP 49 Not Used
LMP 50 Rt. 3-Bank Bottom
LMP 51 Rt. 3-Bank Middle
LMP 52 Rt. 3-Bank Top
LMP 53 Left Outlane
LMP 54 Left Return Lane
LMP 55 Right Return Lane
LMP 56 Right Outlane
LMP 57 Mr. Hankey: Body
LMP 58 Mr. Hankey: Body
LMP 59 Mr. Hankey: Lt. Hand
LMP 60 Mr. Hankey: Rt. Hand
LMP 61 Mr. Hankey: Head
LMP 62 Mr. Hankey: Hat
LMP 63 Pop Bmpr. Target Lt.
LMP 64 Pop Bmpr. Target Rt.
LMP 65 Not Used
LMP 66 Not Used
LMP 67 Not Used
LMP 68 Not Used
LMP 69 Not Used
LMP 70 Not Used
LMP 71 Not Used
LMP 72 Not Used
LMP 73 Not Used
LMP 74 Not Used
LMP 75 Not Used
LMP 76 Not Used
LMP 77 Not Used
LMP 78 Not Used
LMP 79 Not Used
LMP 80 Not Used
DOTS
Please Note: Lamp Descriptions may differ slightly than that of the Dot Display due to space restraints.
I-O Bd. J13-
10 BLUE Power Out for +18v for Disp. Pwr. Sup. Bd. CN1-Pin 6
YEL-BRN 9 Lamp Drive 1: U17
YEL-RED 8 Lamp Drive 2: U16
YEL-ORG 7 Lamp Drive 3: U15
YEL-BLK 6 Lamp Drive 4: U14
YEL-GRN 5 Lamp Drive 5: U13
YEL-BLU 4 Lamp Drive 6: U12
YEL-VIO 3 Lamp Drive 7: U11
YEL-GRY 1 Lamp Drive 8: U10
Color
Pin
Column
Lamp Drive IC
Source Nº: VN02N
I-O Bd. J12-
RED-BRN 1 Lamp Return 1: Q33
RED-BLK 2 Lamp Return 2: Q34
RED-ORG 3 Lamp Return 3: Q35
RED-YEL 4 Lamp Return 4: Q36
RED-GRN 5 Lamp Return 5: Q37
RED-BLU 6 Lamp Return 6: Q38
RED-VIO 8 Lamp Return 7: Q39
RED-GRY 9 Lamp Return 8: Q40
N/C 10 Lamp Return 9: Q41
N/C 11 Lamp Return 10: Q42
Color
12 N/C From I-O Pwr. Driver Board J16-Pins 9-15
Pin
Lamp Return Transistor
Source Nº: STP19N06L



See the Pink Pages, Playfield - General Parts (Below) (Page 52) for Terminal Strips, Diodes, Fuses & Holders Part Nºs.

Also Note: *Terminal Strip & Fuse Holder locations shown represent the general location (your game may differ slightly).*



A South Park
Lamp 22: Super Jackpot
Lamp 23: Multiball Ready (Mr. Hankey Sign over Right Ramp)

Lmp 22	ORG
	RED-ORG
Lmp 23	ORG-RED
	RED-ORG

B South Park
Switch 16: Shooter Lane
Switch 45: Super VUK

Sw. 16	ORG-GRY
	WHT-GRY
Sw. 45	ORG-GRN
	WHT-GRN

C South Park
Switch 46: VUK
Lamp 30: Kenny Assy. #555 Bulb inside

Sw. 46	ORG-BLU
	WHT-BLU
Lmp 30	RED-YEL
	ORG-YEL

D South Park
Lamp 48: Toilet Rt. (S.U.)
Lamp 46: Toilet Lt. (S.U.)
#555 Bulbs outside

Lmp 48	ORG-BLU
	RED-BLU
Lmp 46	ORG
	RED-BLU

All switches, lamps, coils require diodes. The diodes not physically located on the switch, lamp or coil are located on Terminal Strips under the playfield. The Switch & Lamp Matrix Grids also note which switch or lamp has a diode on a Terminal Strip (noted by "DOTS" meaning "Diode on Terminal Strip"). There are diodes located on solder lugs for the Magnet Fuses. All fuses are 3A 250v Slo-Blo, do not over-fuse.

E South Park
Lamp 40: Bottom Turbo Bumper (Pop)

Lmp 40	RED-GRN
	BLK
	BLK
	YEL-GRY

F South Park
Lamp 39: Right Turbo Bumper (Pop)

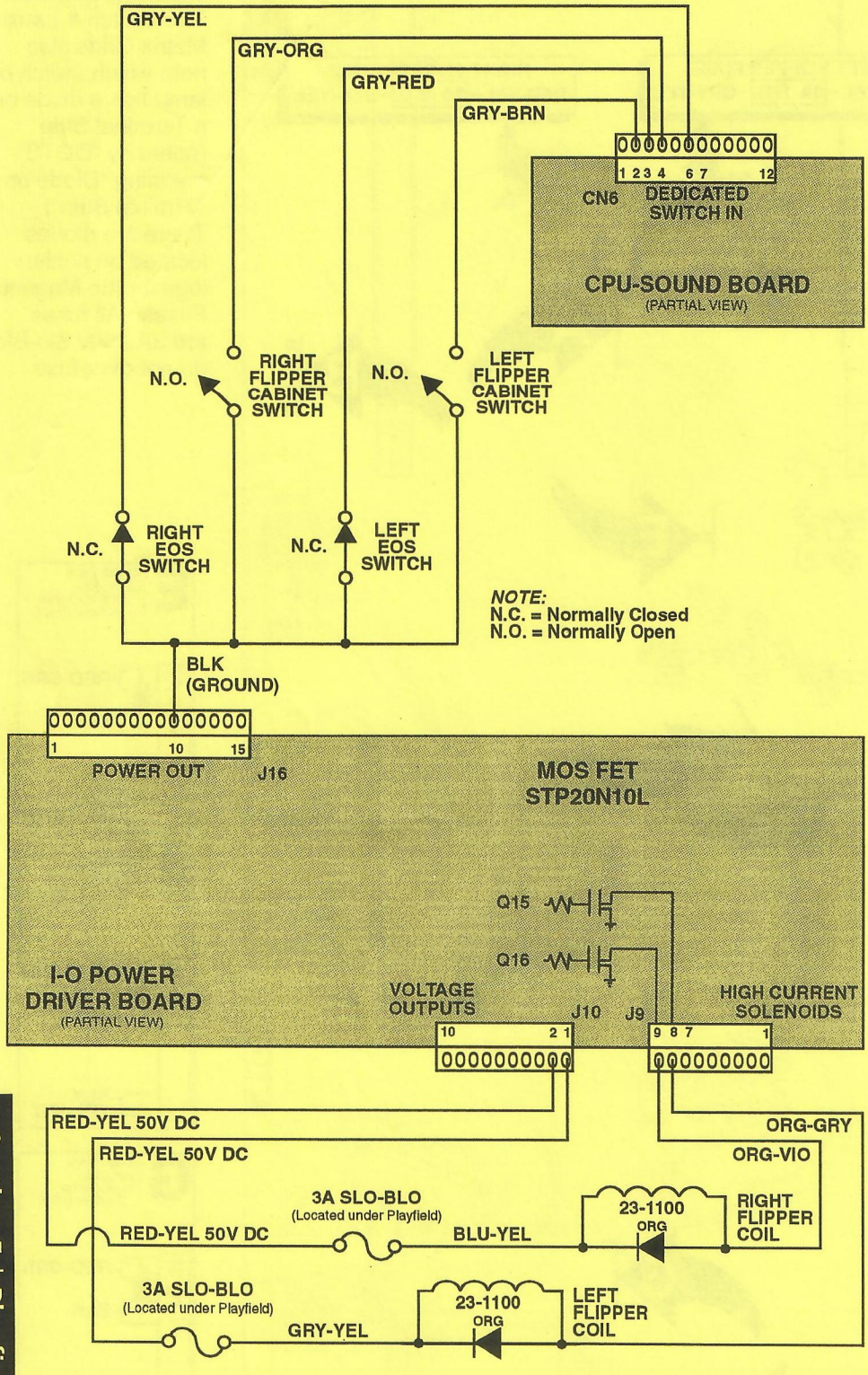
Lmp 39	RED-GRN
	BLK
	BLK
	YEL-VIO

G South Park
Lamp 38: Left Turbo Bumper (Pop)

Lmp 38	RED-GRN
	BLK
	BLK
	YEL-BLU

2-Flipper Circuit Wiring Diagram

The **White Star Board System**™ has allowed us to *simplify* the flipper circuit to the point where we have *eliminated the flipper board* all together. The flipper circuit is now configured the same as any other solenoid drive circuit.



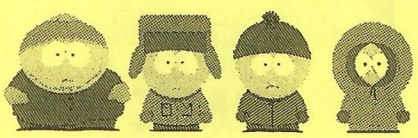
Technical Overview

Our ***New Flipper System*** uses one supply voltage (50v DC) for both kick and hold. Once the **Game CPU** detects a flipper cabinet switch closure (during game play) it applies a 40 msec pulse to the gate of the flipper drive transistor (STP20N10L). If it continues to detect a flipper cabinet switch closure (the player holding the button in) it will continue to pulse the flipper drive transistor 1 msec every 12 msecs for the duration of the hold cycle.

The **E.O.S.** (End-Of-Stroke) **Switch** serves the same function as before as it prevents foldback when the player has the flipper energized to capture balls. The **E.O.S. Switch** is a normally closed switch which opens approximately a 1/16" when the flipper is energized. The **Game CPU** will detect a switch closure if the flipper bat is forced back by a high velocity shot or rebound on the playfield and will apply another 40 msec pulse of 50v DC to the coil.

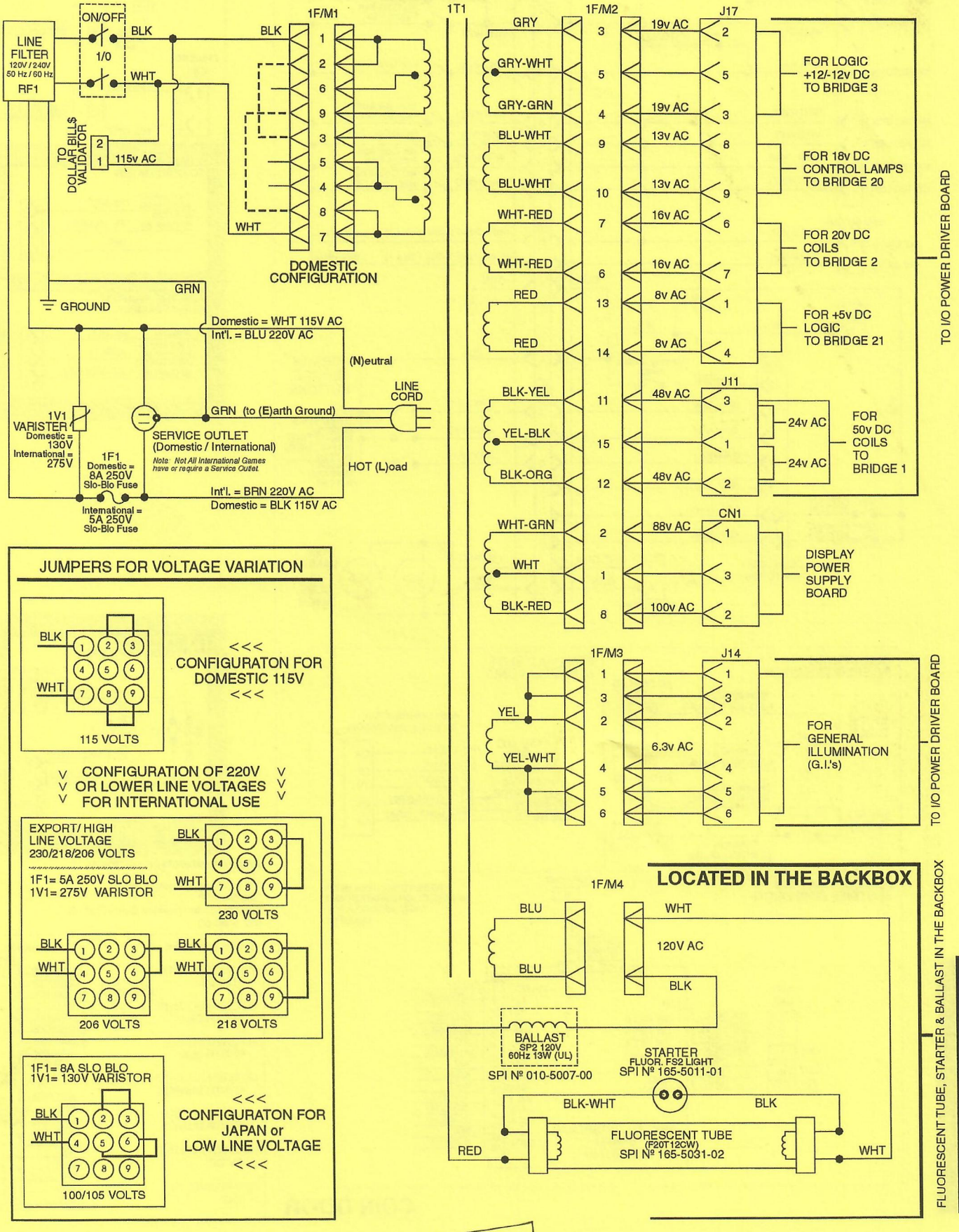
P20N10L

Section 5 | Playfield



Cabinet Wiring

Transformer Power Wiring Diagram



JUMPERS FOR VOLTAGE VARIATION

<<< CONFIGURATON FOR DOMESTIC 115V <<<

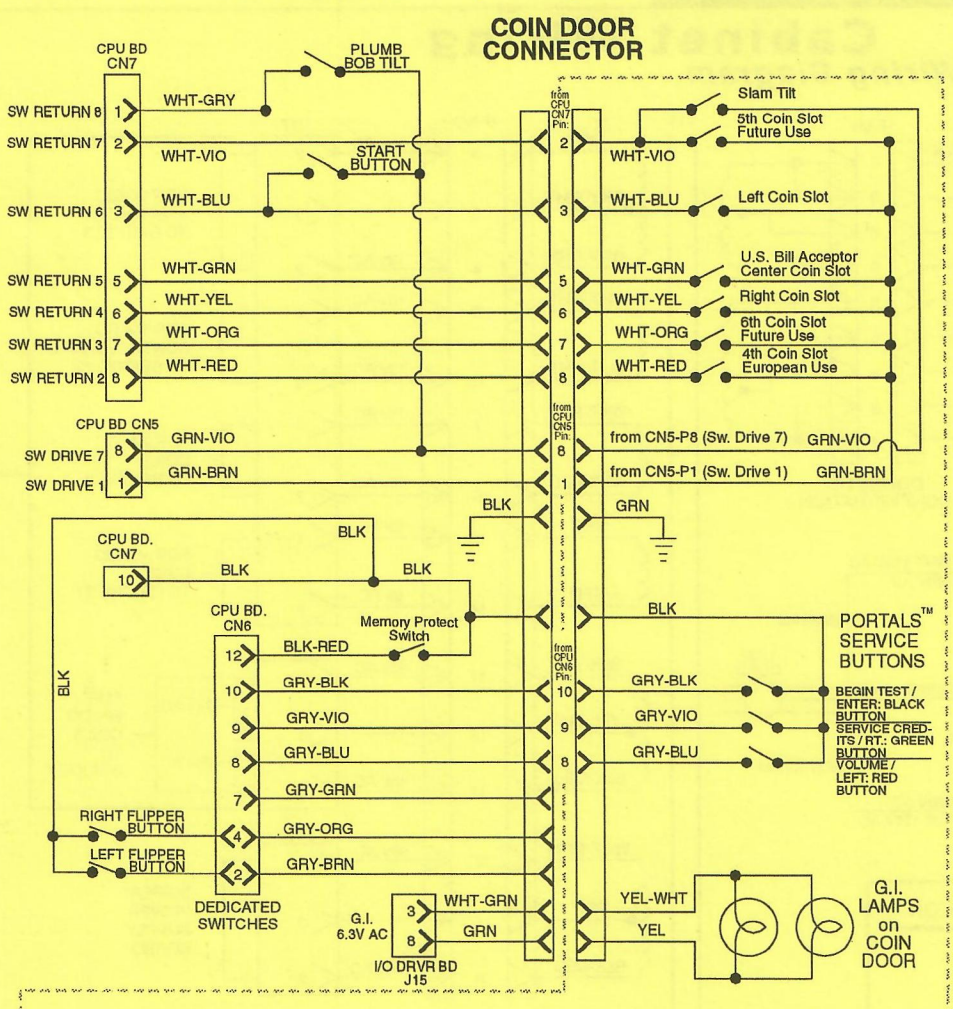
V V V CONFIGURATION OF 220V OR LOWER LINE VOLTAGES FOR INTERNATIONAL USE V V V

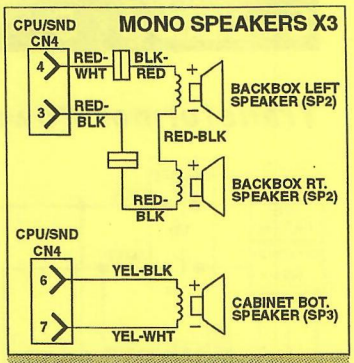
EXPORT/ HIGH LINE VOLTAGE
230/218/206 VOLTS

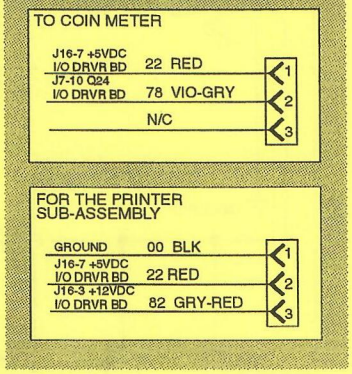
1F1= 5A 250V SLO BLO
1V1= 275V VARISTOR

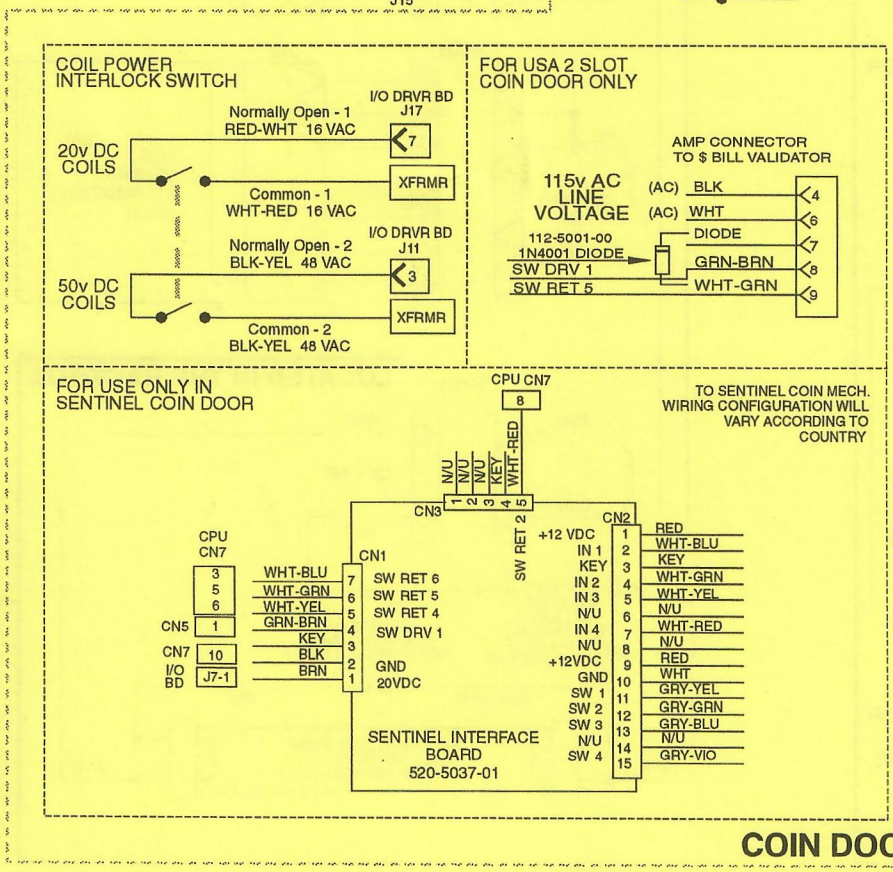
1F1= 8A SLO BLO
1V1= 130V VARISTOR

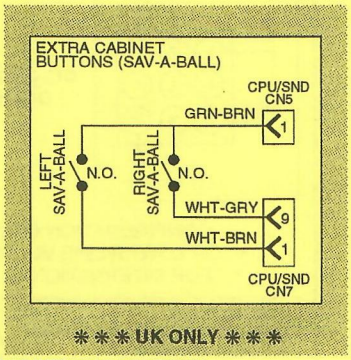
<<< CONFIGURATON FOR JAPAN or LOW LINE VOLTAGE <<<





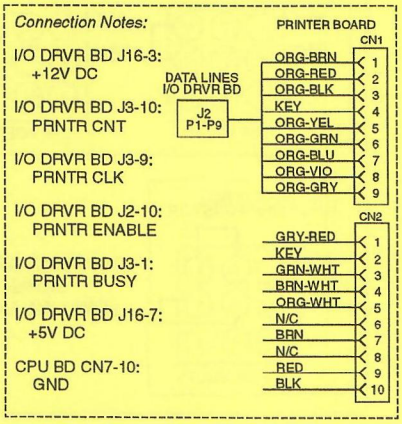

TO COIN METER
J16-7 +5VDC I/O DRVR BD 22 RED
J7-10 Q24 I/O DRVR BD 78 VIO-GRY
N/C
FOR THE PRINTER SUB-ASSEMBLY
GROUND 00 BLK
J16-7 +5VDC I/O DRVR BD 22 RED
J16-3 +12VDC I/O DRVR BD 82 GRY-RED

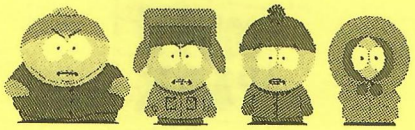




PRINTER INTERFACE OPTIONAL

Cable Wiring Harness Part Nº:
036-5408-00
RS-232 Printer Interface Board Part Nº:
520-5069-00

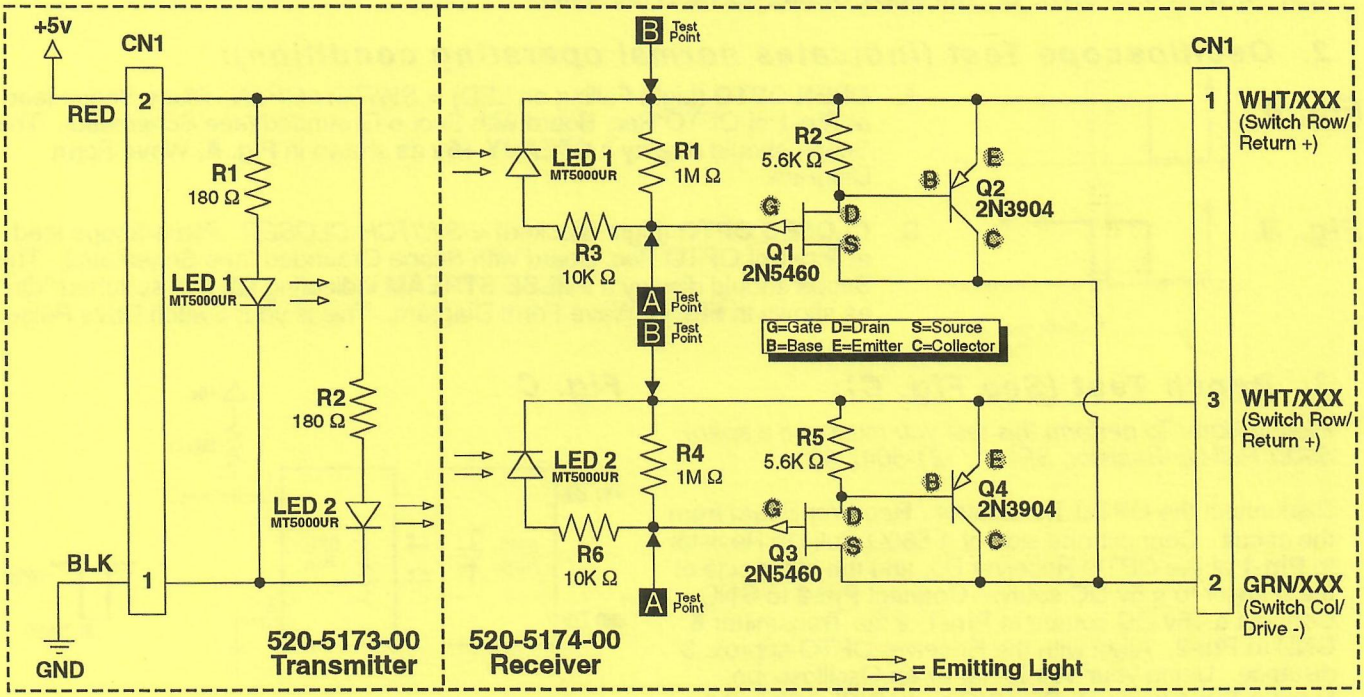




Printed Circuit Boards (PCBs)

Trough Up-Kicker Dual OPTO Boards Theory of Operation & Schematic

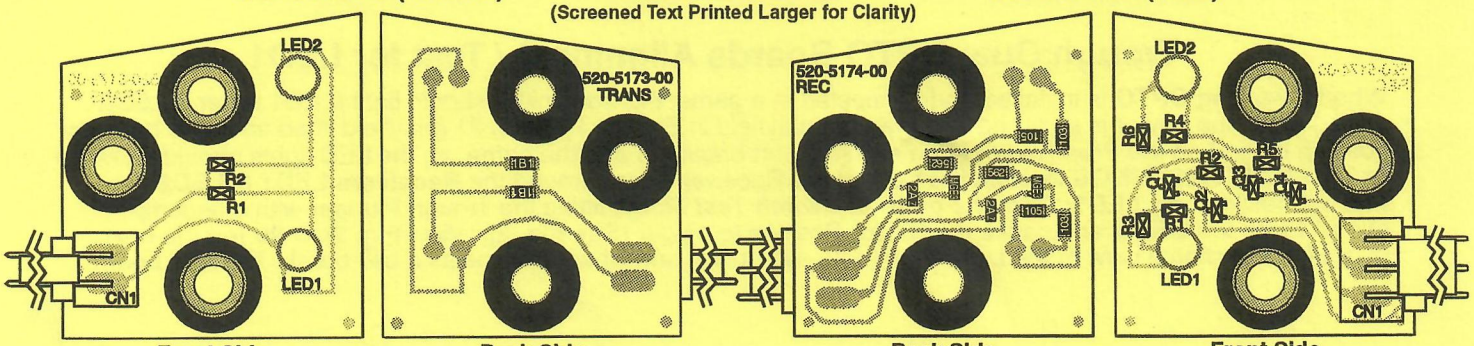
As light from the **Transmitter LED1** falls on the **Receiver LED1**, it generates a Positive Bias Voltage (0.7v to 1.5v) which is applied to the **Gate** (**G**) of **Q1** (Fet 2N5460), turning **Q1** off. When **Q1** is held off, no current flows through **Q2**'s (Fet 2N3906) **Base** (**B**). With no *base current*, **Q2** is off and acts as an *OPEN SWITCH*. When the light is interrupted (*BLOCKED*) **R1** (Rec. Bd.) bleeds the gate voltage off of **Q1** allowing it to conduct, switching **Q2** on, which acts as a *CLOSED SWITCH*. The **LED2 (Trans/Rec) Circuit** operates the same.



Trough Up-Kicker Dual OPTO Boards Component Layout & Parts

520-5173-00 (TRANS) **Boards Actual Size** **520-5174-00 (REC)**

(Screened Text Printed Larger for Clarity)



Front Side (LEDs & 2-Pin Connector) **Back Side (Solder / SMDs)** **Back Side (Solder / SMDs)** **Front Side (LEDs & 3-Pin Connector)**

ITEM	QTY	PART NUMBER	REF-DESIGNATOR
A	**1**	**515-0173-00**	Dual-OPTO Trans. Bd. Assy.
—	**1**	**520-5173-00**	Dual-OPTO Trans. Bd.
1	2	165-5100-00	LED1, LED2
2	2	121-5067-00	R1, R2
3	1	045-5111-02	CN1
4	3	545-5518-00	n/a
5	3	530-5308-02	n/a
B	**1**	**515-0174-00**	Dual-OPTO Rec. Bd. Assy.
—	**1**	**520-5174-00**	Dual-OPTO Rec. Bd.
1	2	165-5100-00	LED 1, LED 2
2	2	121-5068-00	R1, R4
3	2	121-5069-00	R2, R5
4	2	121-5011-00	R3, R6
5	2	110-5006-00	Q1, Q3
6	2	110-0069-00	Q2, Q4
7	1	045-5111-03	CN1
8	3	545-5518-00	n/a
9	3	530-5308-02	n/a

LED MT5000UR
(T1-3/4 GaAlAs)
(Ultra Bright Red)
Sega Pinball Part №
165-5100-00

DESCRIPTION

PCB Assy. (with all **Items 1-5**)
PCB Assy. (with **Items 1-3** only)
LED MT5000UR (Ultra Bright Red)
180 Ω 1/8W Chip Res. (CRCW)
2X, .156" Rt. Angle (26-60-5020) Conn.
OPTO PCB Rubber Grommet
OPTO PCB Brass Tube Spacer
PCB Assy. (with all **Items 1-9**)
PCB Assy. (with **Items 1-7** only)
LED MT5000UR (Ultra Bright Red)
1M Ω 1/8W Chip Res. (CRCW)
5.6K Ω 1/8W Chip Res. (CRCW)
10K Ω 1/8W Chip Res. (CRCW)
2N5460, Transistor (P-FET SOT-23)
2N3904, Transistor
3X, .156" Rt. Angle (26-60-5030) Conn.
OPTO PCB Rubber Grommet
OPTO PCB Brass Tube Spacer

OPTO Troubleshooting

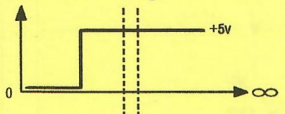
1. Volt Meter Test (indicates normal operating condition):

A. **OPEN OPTO** (Light Falling on LED) = *SWITCH OPEN*. Place meter leads across points **A** and **B** on the **LED1 Circuit** (Refer to Schematic Drawing on previos page, 520-5174-00 Receiver Side). It should read approximately 0.8 - 1.2v DC. The **LED2 Circuit** operates the same.

B. **CLOSED OPTO** (Light Blocked) = *SWITCH CLOSED*. Place meter leads across points **A** and **B** on the **LED1 Circuit** (Refer to Schematic Drawing on previous page, 520-5174-00 Receiver Side). It should read approximately 0.0 - 0.1v DC. The **LED2 Circuit** operates the same.

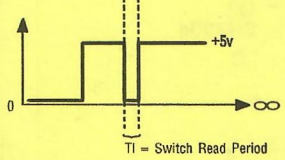
2. Oscilloscope Test (indicates normal operating condition):

Fig. A



A. **OPEN OPTO** (Light Falling on LED) = *SWITCH OPEN*. Place Scope lead at **Pin-1** of OPTO Rec. Board with Scope Grounded (see Schematic). The Scope should display a **STEADY +5v** as shown in **Fig. A**, Wave Form Diagram.

Fig. B

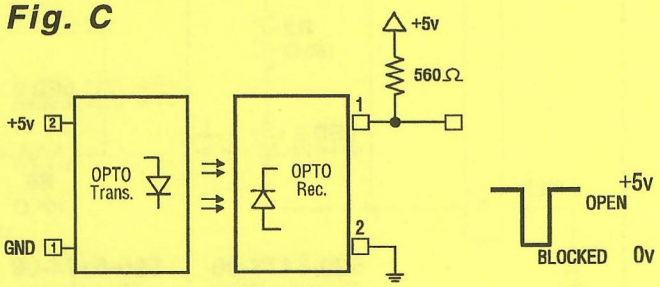


B. **CLOSED OPTO** (Light Blocked) = *SWITCH CLOSED*. Place Scope lead at **Pin-1** of OPTO Rec. Board with Scope Grounded (see Schematic). The Scope should display a **PULSE STREAM** indicating **Q2** has switched "On" as shown in **Fig. B**, Wave Form Diagram. This is your Switch Drive Pulse.

3. Bench Test (See Fig. C):

Please Note: To perform this test you must use a spare 560Ω Pull-Up Resistor, SPI Nº: 121-5047-00

Fig. C

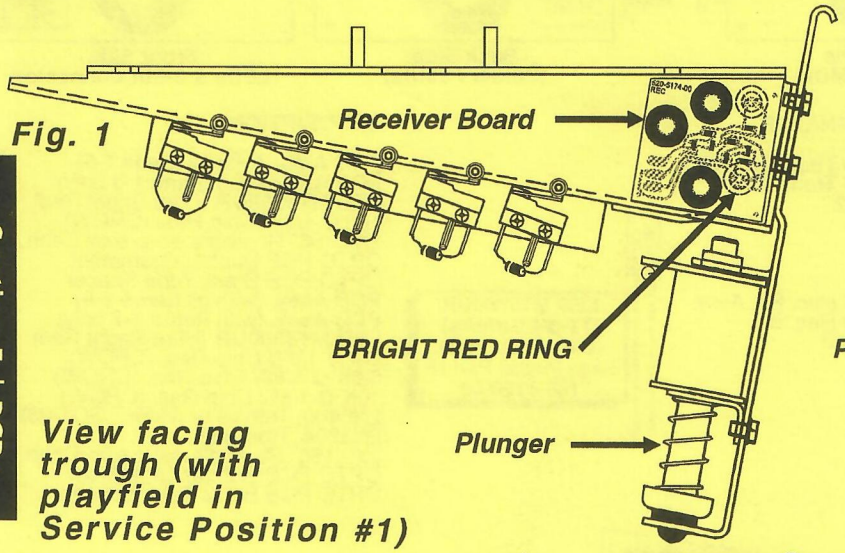


Disconnect the OPTO Transmitter / Receiver Board from the circuit. Connect one side of a 560Ω Pull-Up Resistor to **Pin-1** of the OPTO Receiver Bd. and the other side of the resistor to a 5v DC source. Connect **Pin-2** to GND. Connect a +5v DC source to **Pin-1** of the Transmitter & GND to **Pin-2**. Align with the Receiver OPTO approx. 3" distance. Using your Volt-Meter or an Oscilloscope, monitor **Pin-1** while *BLOCKING* and *UNBLOCKING* the ***BEAM*** from the Trans. The output will be approx. +5v DC when the ***BEAM IS NOT BLOCKED*** and approx. 0v when the ***BEAM IS BLOCKED.***

Trough Dual OPTO Boards Alignment / Test for LED1

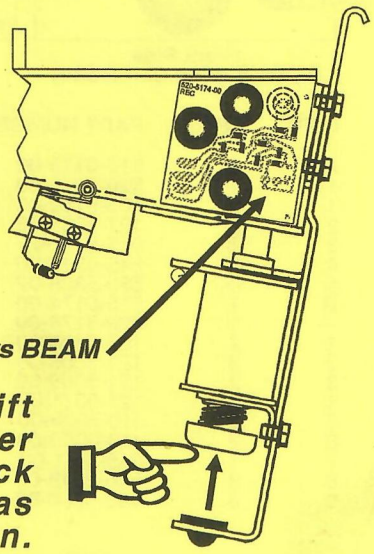
When a working **OPTO** is installed and connected in a game, the transmitter should light (LED1 lower & LED2 upper) when the power is switched on. With the playfield in Service Position #1 (playfield lifted up in the half-way position resting on the Prop Rod or edge slide support brackets) and the game on, the LED lights should show up as a **BRIGHT RED RINGS** through the back of the Receiver Board around the **Receivers LED1 & LED2** (See **Fig. 1**). Testing only **LED1:** With the game in ***Switch Test Mode***, lifting the Trough Plunger with a fingertip should block the **BEAM** and cause the Switch Position to trigger (See **Fig. 2**). View **Fig. 2a** & **2b** (on the next page) for a sectional view of the Light Path (note alignment) and what happens as a ball breaks the light beam.

Fig. 1



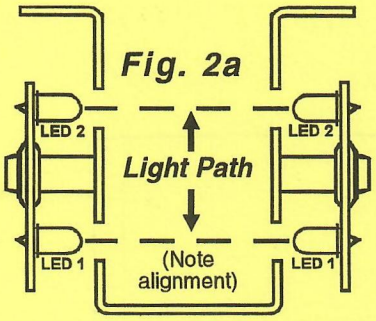
View facing trough (with playfield in Service Position #1)

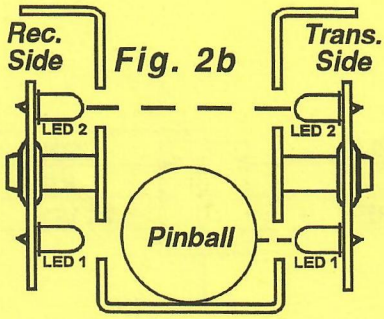
Fig. 2



Lift plunger to check switch as shown.

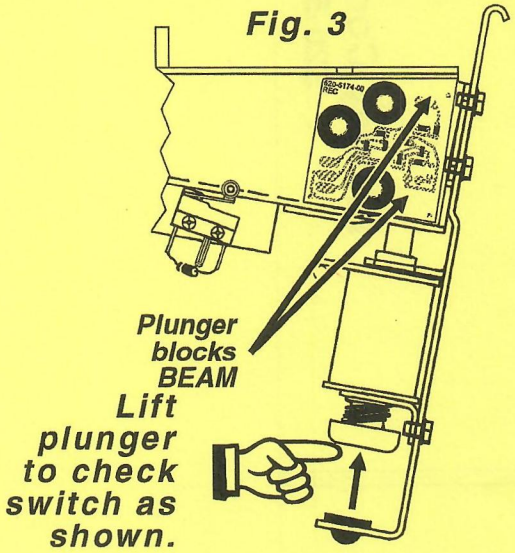
Sectional view from right (Fig. 2a & 2b)

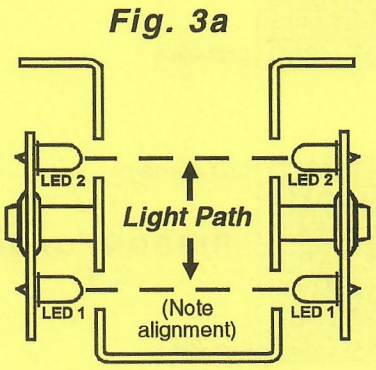


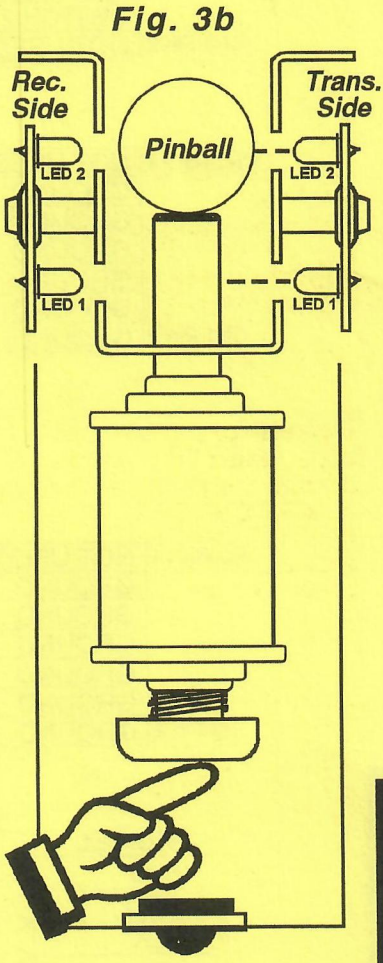


Trough Dual OPTO Boards Alignment / Test for LED2

When a working **OPTO** is installed and connected in a game, the transmitter should light (LED1 lower & LED2 upper) when the power is switched on. With the playfield in Service Position #1 (playfield lifted up in the half-way position resting on the Prop Rod or edge slide support brackets) and the game on, the LED lights should show up as a **BRIGHT RED RINGS** through the back of the Receiver Board around the **Receivers LED1 & LED2** (See **Fig. 1, previous page**). Testing only **LED2:** *TO PERFORM THIS TEST, A PINBALL MUST BE IN THE BALL TROUGH.* With the game in ***Switch Test Mode***, lifting the Trough Plunger with a finger tip should block the **BEAM** on LED2 and cause the Switch Position to trigger (See **Fig. 3**). View **Fig. 3a** & **3b** for a sectional view of the Light Path (note alignment) and what happens as a "double-stacked" ball scenario breaks the light beam.







I M P O R T A N T
*If replacement of **LED** is required, insure that is **mounted correctly** before and after soldering (See **Fig. 4a / 4b**).*

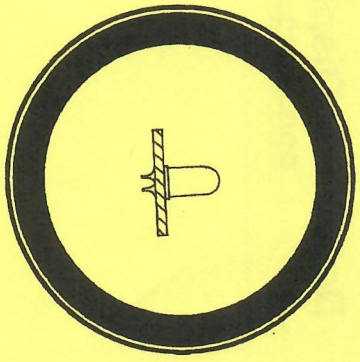


Fig. 4a
Correct Position

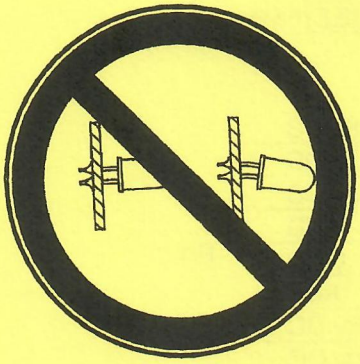
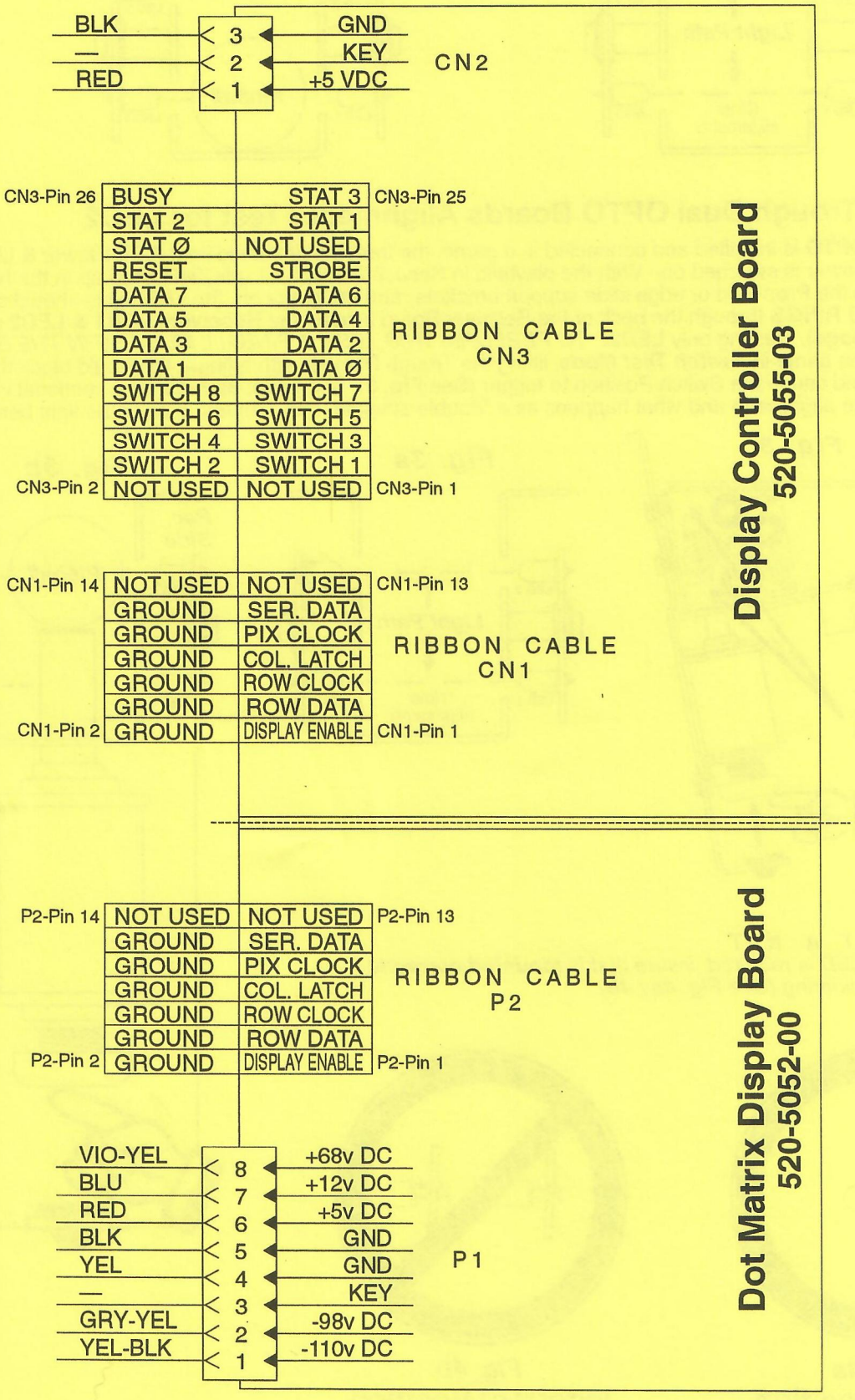
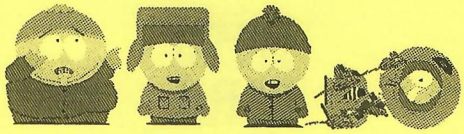
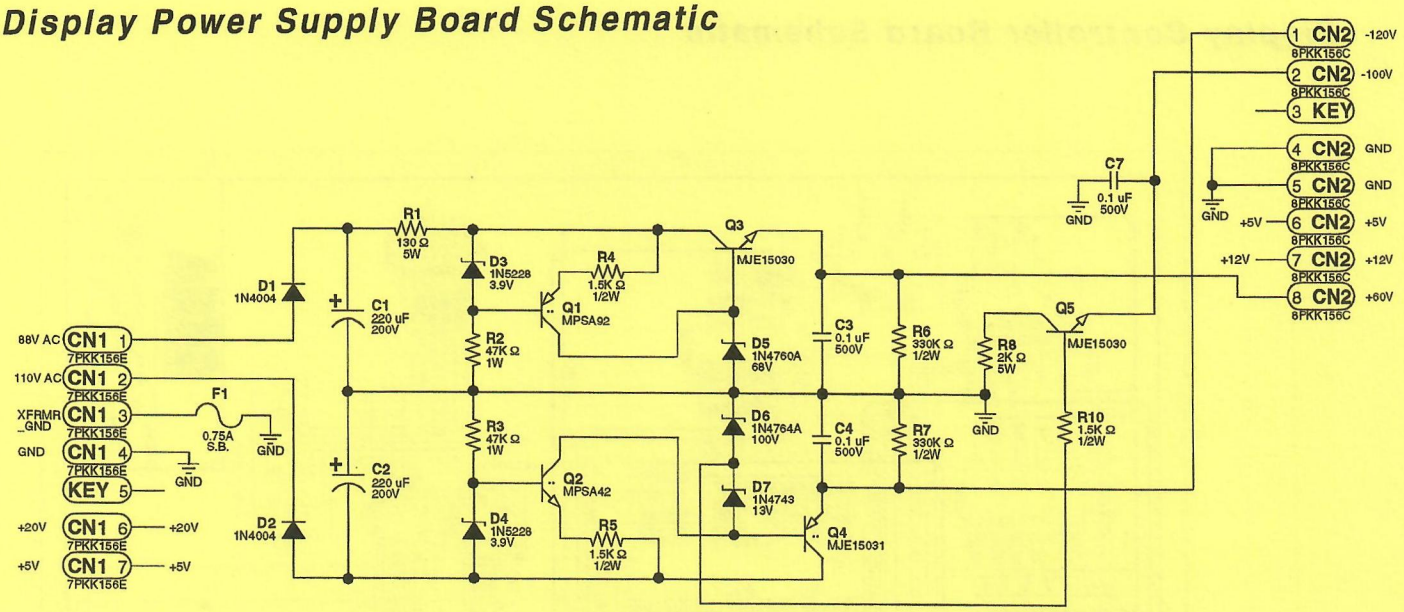


Fig. 4b
Incorrect Position

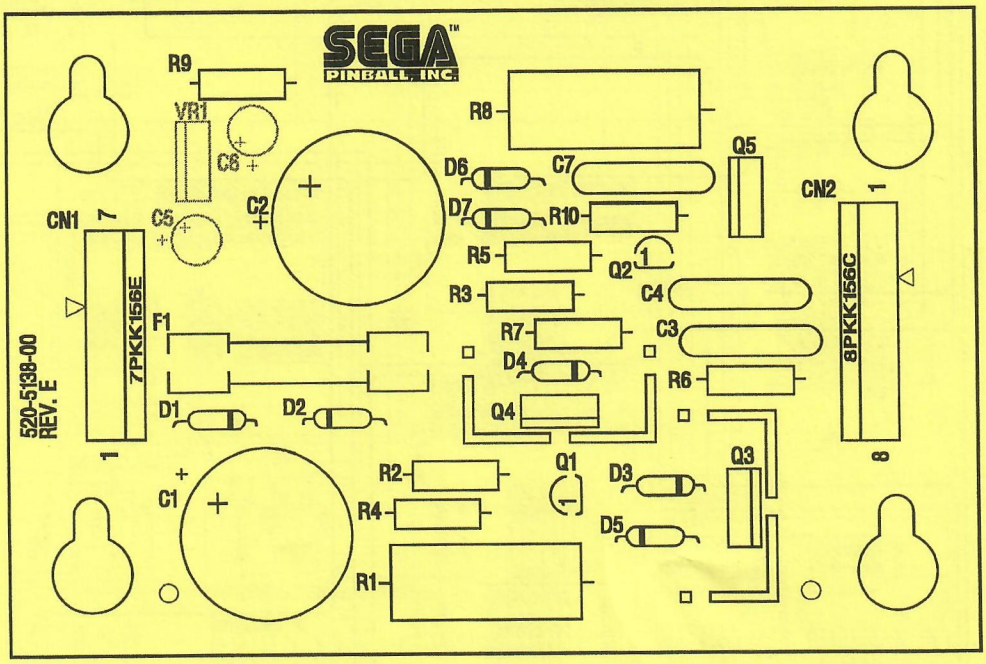

BLK
—
RED
3
2
1
GND
KEY
+5 VDC
CN2
CN3-Pin 26
BUSY
STAT 3
CN3-Pin 25
STAT 2
STAT 1
STAT Ø
NOT USED
RESET
STROBE
DATA 7
DATA 6
DATA 5
DATA 4
DATA 3
DATA 2
DATA 1
DATA Ø
SWITCH 8
SWITCH 7
SWITCH 6
SWITCH 5
SWITCH 4
SWITCH 3
SWITCH 2
SWITCH 1
CN3-Pin 2
NOT USED
NOT USED
CN3-Pin 1
RIBBON CABLE
CN3
CN1-Pin 14
NOT USED
NOT USED
CN1-Pin 13
GROUND
SER. DATA
GROUND
PIX CLOCK
GROUND
COL. LATCH
GROUND
ROW CLOCK
GROUND
ROW DATA
CN1-Pin 2
GROUND
DISPLAY ENABLE
CN1-Pin 1
RIBBON CABLE
CN1
Display Controller Board
520-5055-03
P2-Pin 14
NOT USED
NOT USED
P2-Pin 13
GROUND
SER. DATA
GROUND
PIX CLOCK
GROUND
COL. LATCH
GROUND
ROW CLOCK
GROUND
ROW DATA
P2-Pin 2
GROUND
DISPLAY ENABLE
P2-Pin 1
RIBBON CABLE
P2
VIO-YEL
BLU
RED
BLK
YEL
—
GRY-YEL
YEL-BLK
8
7
6
5
4
3
2
1
+68v DC
+12v DC
+5v DC
GND
GND
KEY
-98v DC
-110v DC
P1
Dot Matrix Display Board
520-5052-00



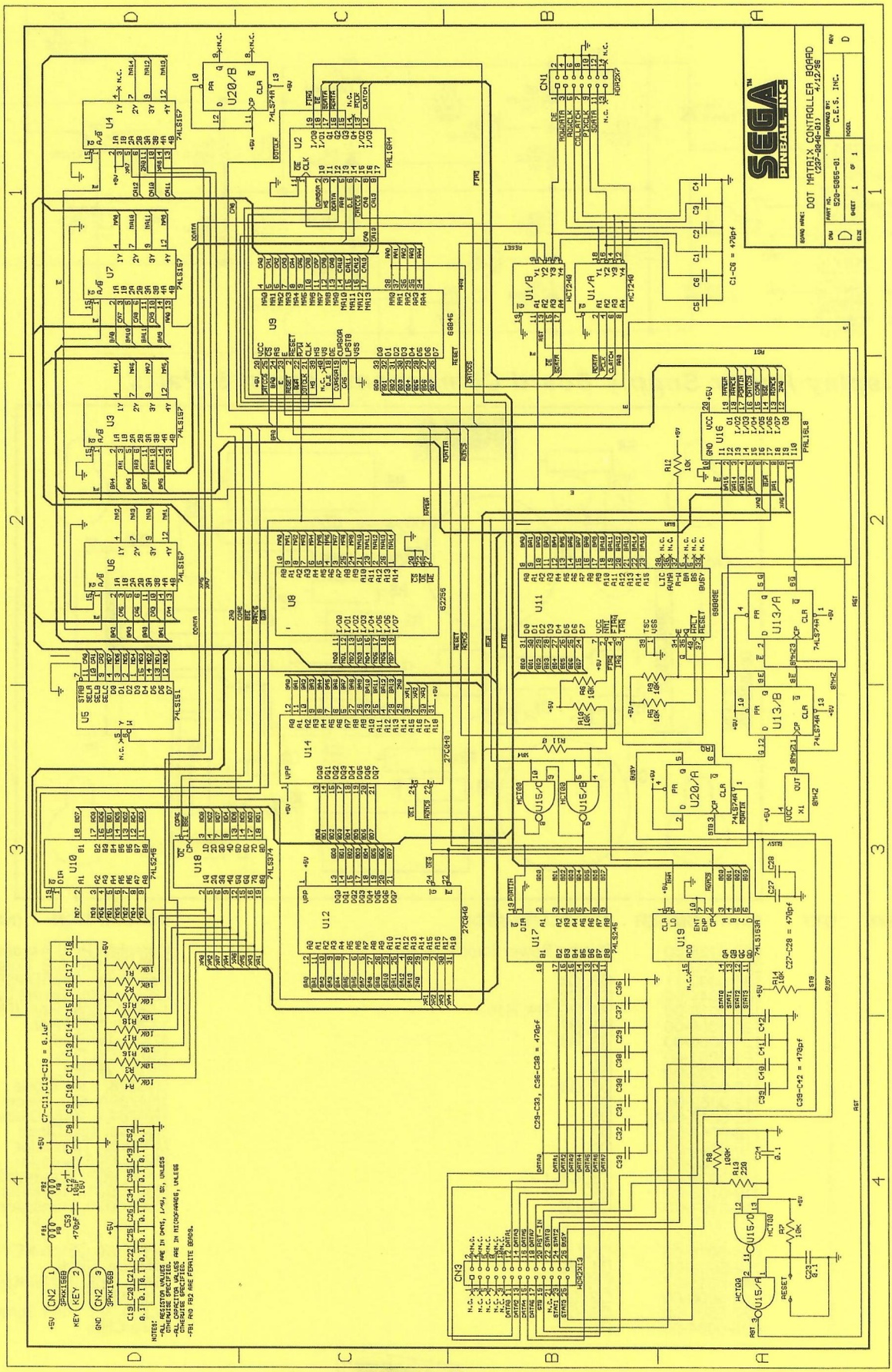
Display Power Supply Board Schematic

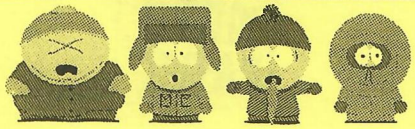


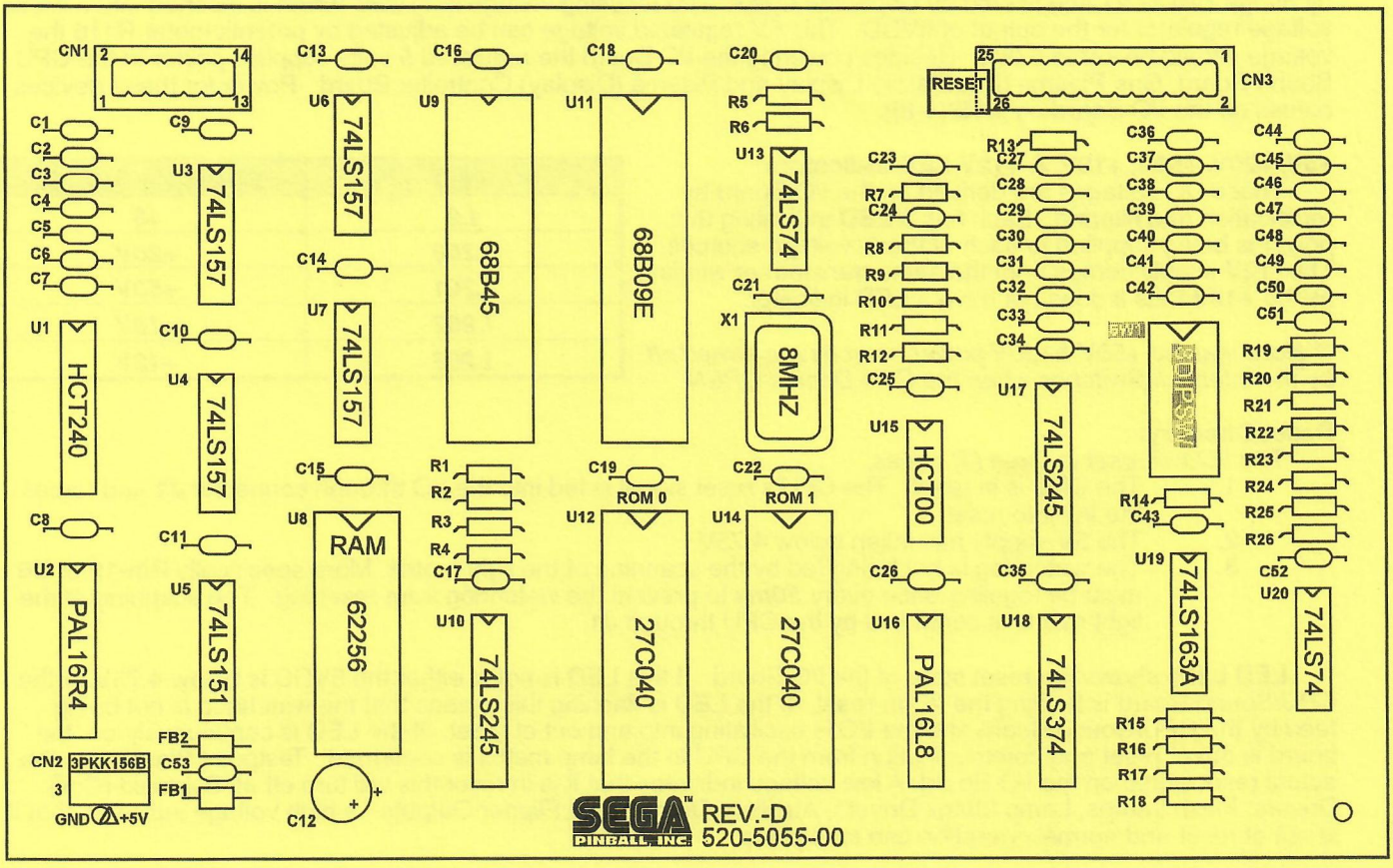
Display Power Supply Board Component Layout & Parts



ITEM	QTY	PART NUMBER	REF-DESIGNATOR	DESCRIPTION (NS = Not Stuffed)
—	1	520-5138-00	Display Power Supply Board	Complete PCB Assembly
1	1	200-5000-17	F1	3/4A (0.75A) S.B. Fuse
2	2	535-5000-11	Q3, Q4	Heatsinks - AAVID #563002
3	2	125-5044-00	C1, C2	220uF, 200v, Radial Lytic Cap.
4	4	121-5038-00	R4, R5, R9, R10	1.5K Ω 1/2W Res. (R9: NS)
5	2	121-5059-00	R6, R7	330K Ω 1/2W Res.
6	2	121-5060-00	R2, R3	47K Ω 1W Res.
7	1	121-5061-00	R1	130 Ω 5W Res.
8	1	121-5062-00	R8	2K Ω 5W Res.
9	2	112-0053-00	D3, D4	1N5228, 3.9v, Diode
10	1	112-0062-00	D5	1N4760A, 68v, Diode
11	1	112-0049-00A	D6	1N4764A, 100v, Diode
12	1	112-0061-00	D7	1N4743, 13v, Diode
13	1	110-0100-00	Q1	MPSA92, Transistor
14	1	110-0082-00	Q2	MPSA42, Transistor
15	3	125-5035-00	C3, C4, C7	0.1uF, 500v, Ceramic Disk Cap.
16	1	110-0103-00	Q4	MJE15031, Transistor
17	2	110-0101-00	Q3, Q5	MJE15030, Transistor
18	0	125-5003-00	C5, C6	22uF, 25v, Rad Lytic Cap (C5, C6: NS)
19	0	124-5003-00	VR1	7812CT (VR1: NS)
20	1	045-5015-08	CN2	8PKK156 (PIN3=KEY)
21	2	112-5003-00	D1, D2	1N4004, Diode
22	1	045-5015-07	CN1	7PKK156E (PIN5=KEY)
23	2	240-5008-00	Q3, Q4	6/32 KEPS Nut
24	2	237-5501-00	Q3, Q4	6/32 X 3/8" PPH Screw
25	2	205-0004-00	F1	Fuse Clips


SEGA
PINBALL, INC.
DOT MATRIX CONTROLLER BOARD
520-5865-01
C.E.S. INC.
4/12/96
U1/B
U1/A
HC7240
U20/B
U20/A
74LS74A
U2
PAL16R4
U4
U5
U6
U7
74LS157
74LS151
U3
U9
68B45
U8
62256
U11
68B09E
U13/A
U13/B
U16
PAL16L8
U14
27C040
U12
U10
74LS245
U18
74LS374
U17
U19
74LS163A
U15/A
U15/B
U15/C
HCT00
CN1
CN2
CN3
SPKR156B
HDR25V
HDR2SV13
C1-C6 = 470pf
C7-C11,C13-C18 = 0.1uF
C27-C28 = 470pf
C29-C33, C35-C38 = 470pf
C39-C42 = 470pf
R1 10K
R2 10K
R3 10K
R4 10K
R5 10K
R6 10K
R7 10K
R8 100K
R9 10K
R10 10K
R11 10K
R12 10K
R13 220
RN1 10K
RN2 10K
RN3 10K
RN4 10K
RESET
NOTES:
-ALL RESISTOR VALUES ARE IN OHMS, 1/4W, 5%, UNLESS OTHERWISE SPECIFIED.
-ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
-FB1 AND FB2 ARE FERRITE BEADS.





ITEM	QTY	PART NUMBER	REF-DESIGNATOR	DESCRIPTION (NS = Not Stuffed)
—	1	520-5055-03	Display Controller Board (FCC FEB98)	Complete PCB Assembly
1	2	077-5217-00	U12, U14	32-Pin, IC Dip Socket
2	1	100-0397-00	U8	32K X 8 Static RAM (62256L-10PC)
3	1	100-0189-01	U11	68B09E
4	1	100-0233-00	U9	68B45
5	1	100-0351-00	U15	74HCT00
6	1	100-5001-00	U1	74HCT240
7	1	100-5000-00	U5	74LS151
8	4	100-0046-00	U3, U4, U6, U7	74LS157
9	1	100-0049-00	U19	74LS163A
10	2	100-0058-00	U7, U10	74LS245
11	1	100-0064-00	U18	74LS374
12	2	100-0037-00	U13, U20	74LS74
13	1	965-0107-00	**U16 - ORANGE DOT** (Note the type of PAL)	PAL16L8 (15CN), (Programmed) **- ORANGE DOT**
14	1	965-0108-00	**U2 - ORANGE DOT** (Note the type of PAL)	PAL16R4 (25CN), (Programmed) **- ORANGE DOT**
15	23	125-5031-00	C7>C11, C13>C26, C34, C35, C43, C52	.1 uF, (104), Axial Cer. Cap
16	1	121-5051-00	R8	100K Ω 1/4W C.F. Res. 5%
17	15	121-5011-00	R1>R7, R9, R10, R12, R14>R18	10K Ω 1/4W Res. 5%
18	1	121-5014-00	R13	220 Ω 1/4W C.F. Res. 5%
19	0	n/a	R19>R26	(R19>R26: NS)
20	21	125-5028-00	C1>C6, C27>C33, C36>C42, C44>C51, C53	470pF, (471), Axl. Cap (C44>C51: NS)
21	2	n/a	FB1, FB2	Ferrite Bead (2743001182)
22	1	125-5015-00	C12	100uF, 25v, Cap. (Radial Elec.)
23	1	045-5015-26	CN3	13-Pin, Dual Row .1" HDR Conn.
24	1	045-5015-03	CN2	3-Pin, KK-156 Conn. (540445-3)
25	1	045-5015-02	CN1	7-Pin, Dual Row .1" Hdr. Conn.
26	1	140-0013-00	X1	8Mhz Clock Oscillator
27	0	Not Used	SW1	(SW1: NS)
28	1	(See Pg. **DR.** ❸ Table)	U12 U14 (ROM 0)	4MB ROM (U14: NS)
29	1	n/a	U1 (@ Pins 9 & 10)	100pF, Cap.

5V Supply:
An AC voltage of approximately 9V comes into the board at [**J17-**(1-4)] this AC voltage is then *full-wave rectified* by bridge **BRDG 21** and filtered by Capacitor **C203**. The resulting voltage is 11VDC which is inserted into a linear voltage regulator for the output of 5VDC. This 5V regulated voltage can be adjusted by potentiometer **R116** the voltage should be set to 5.00V. Besides powering the I/O Board the regulated 5 volts supplies power to the CPU / Sound Board, Gas Plasma (Dot Matrix) Display and Plasma (Display) Controller Board. Power for these devices comes off the I/O Board on [**J16**-(4-8)].

+5V, +20V, +50V, +18V, & +12V LED Indicators:
These DC voltages are derived on the I/O Board by rectification and filtering. Each has a **LED** indicating that power is being supplied to each of these voltage sources. The **-12V** supply comes from the same transformer winding as the **+12V** thus it does not have a **LED** indicator.

*** **Note** that the +50V &+20V power sources are turned off by the Interlock Switches when the Coin Door is OPEN.*

LED	*SUPPLY VOLTAGE*
L2	*+5*
L200	*+20V*
L201	*+50V*
L202	*+18V*
L203	*+12V*

Reset Circuitry:
The I/O will reset in three (3) cases:

1. The CPU is in reset. The CPU's reset signal is fed into the I/O through connector **J1** and forces the I/O into reset.
2. The 5V supply has fallen below 4.75V.
3. The watchdog is not being fed by the scanning of the light matrix. More specifically **Pin-19** of **U6** must be toggling once every ***50ms*** to prevent the watchdog from resetting. The scanning of the light matrix is controlled by the CPU through **J1**.

LED L204 shows the reset state of the I/O Board. If this **LED** is not lit either the 5VDC is below 4.75V or the CPU/Sound Board is holding the I/O in reset. If the **LED** is flashing this means that the watchdog is not being feed by the CPU/Sound Board and the I/O is oscillating into and out of reset. If the **LED** is continuously on the board is out of reset and communication from the CPU to the lamp matrix is confirmed. Testpoint Blanking is the actual reset signal on the I/O Board. A low voltage indicates that it is in reset this will turn off all Solenoid (Coil) Drivers, Flash Lamps, Lamp Matrix Drivers, Auxiliary Outputs and Flipper Outputs. A high voltage indicates that it is out of reset and normal operation can take place.

Address Decoding:
All Address decoding is done by two **74LS138** (3 of 8 decoder). Both of these must be in operation for the I/O Board to function properly.

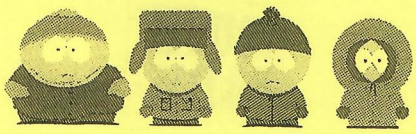
Solenoid (Coil) Drivers & Flash Lamps:
J8 & **J9** are high side drivers for driving solenoids and other heavy loads. Each connector has its own buffer driving 8 drivers. **J8** & **J9** consist of **MOSFET Drivers 20N10L** which can easily & safely be tested by clipping one end of a clip-lead to test point **FET TPL1** and then the other to the corresponding gate resistor **R1-R16** (see *Note 1*). This will apply 3.4V to the gate of the **MOSFET Transistor** thus switching it on. **J7** & **J6** each are a bank of 8 low side driver for driving lamps or other lower current solenoids (coils). They use a Bipolar Power Transistor **TIP122** which can also be tested by using **TEST POINT TIP TPL3** and the corresponding resistors **R17-R32*** *(see Note 1).*

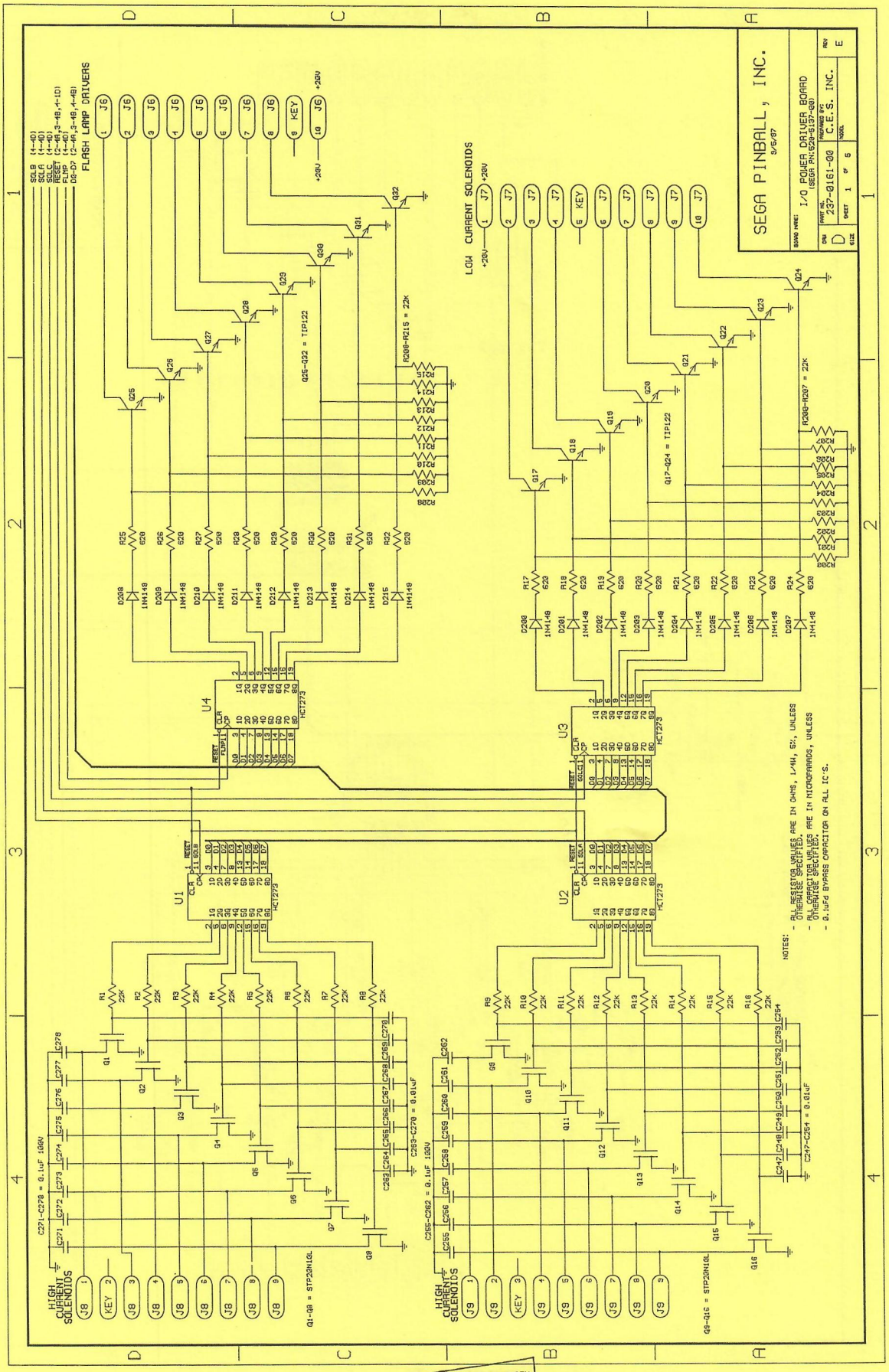
***Note 1** * Clip on the resistor side with the white stripe. ** R1 controls Q1 and R2 controls Q etc...*

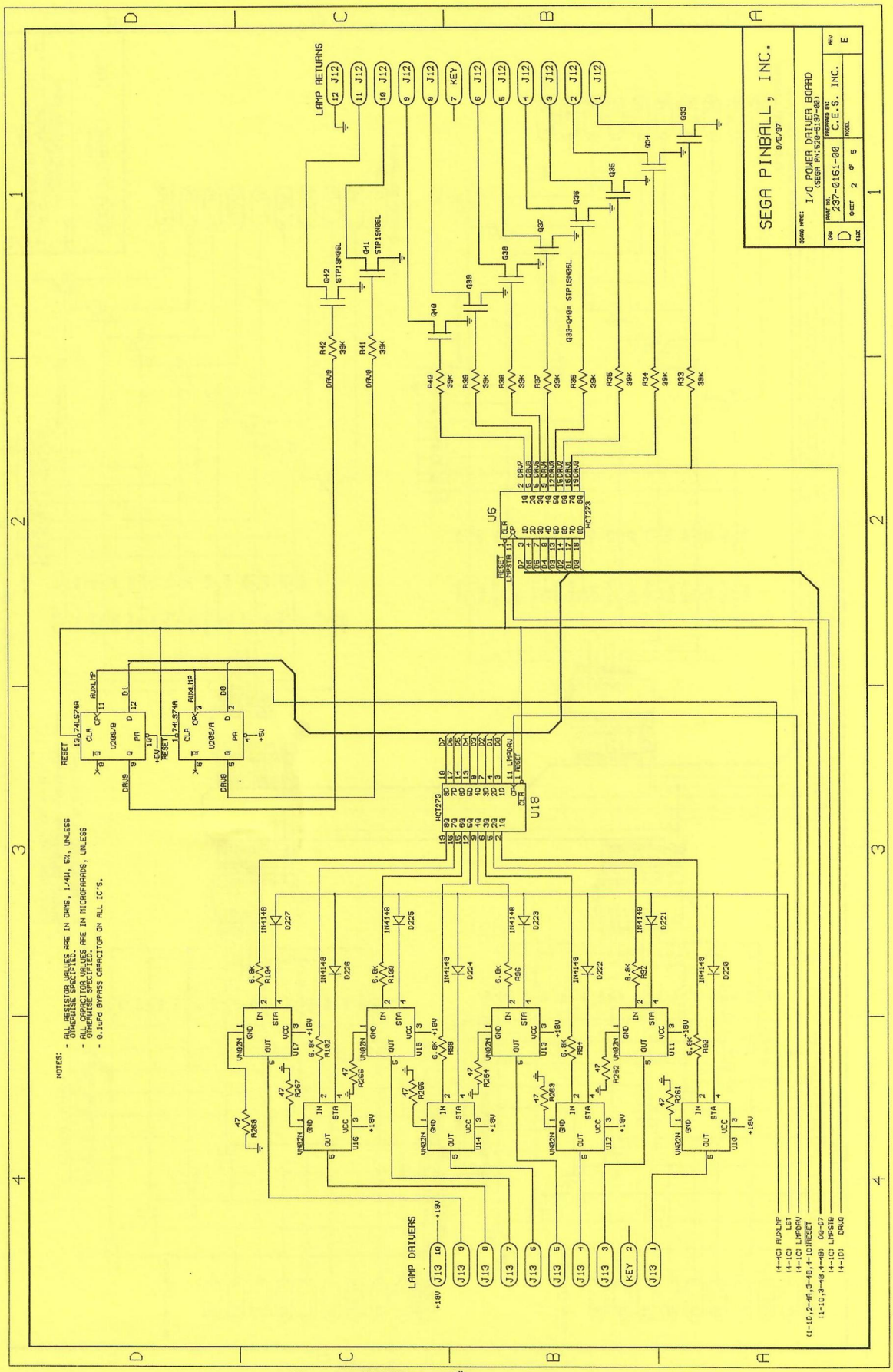
Auxiliary In & Out:
J2-8 CMOS Outputs sometimes used for a printer interface.
J3-8 CMOS Inputs general purpose inputs.

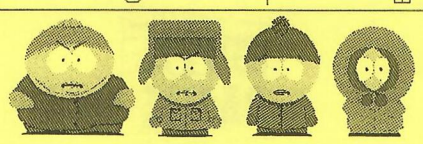
Lamp Matrix:
J12 has 10 low side drivers for the lamp strobes which consist of **19N06L MOSFETS**. Only one lamp strobe should be low at any time. Again the scanning of the lamp strobes keeps the I/O from resetting. **J13** has 8 high side drivers with each having a status indicator. All the status indicators are logically 'OR'ed together and fed back to the CPU/Sound Board. The status can identify open loads (for example open lamp filaments or intermittent connections) and short circuits. These drivers are also short-circuit protected.

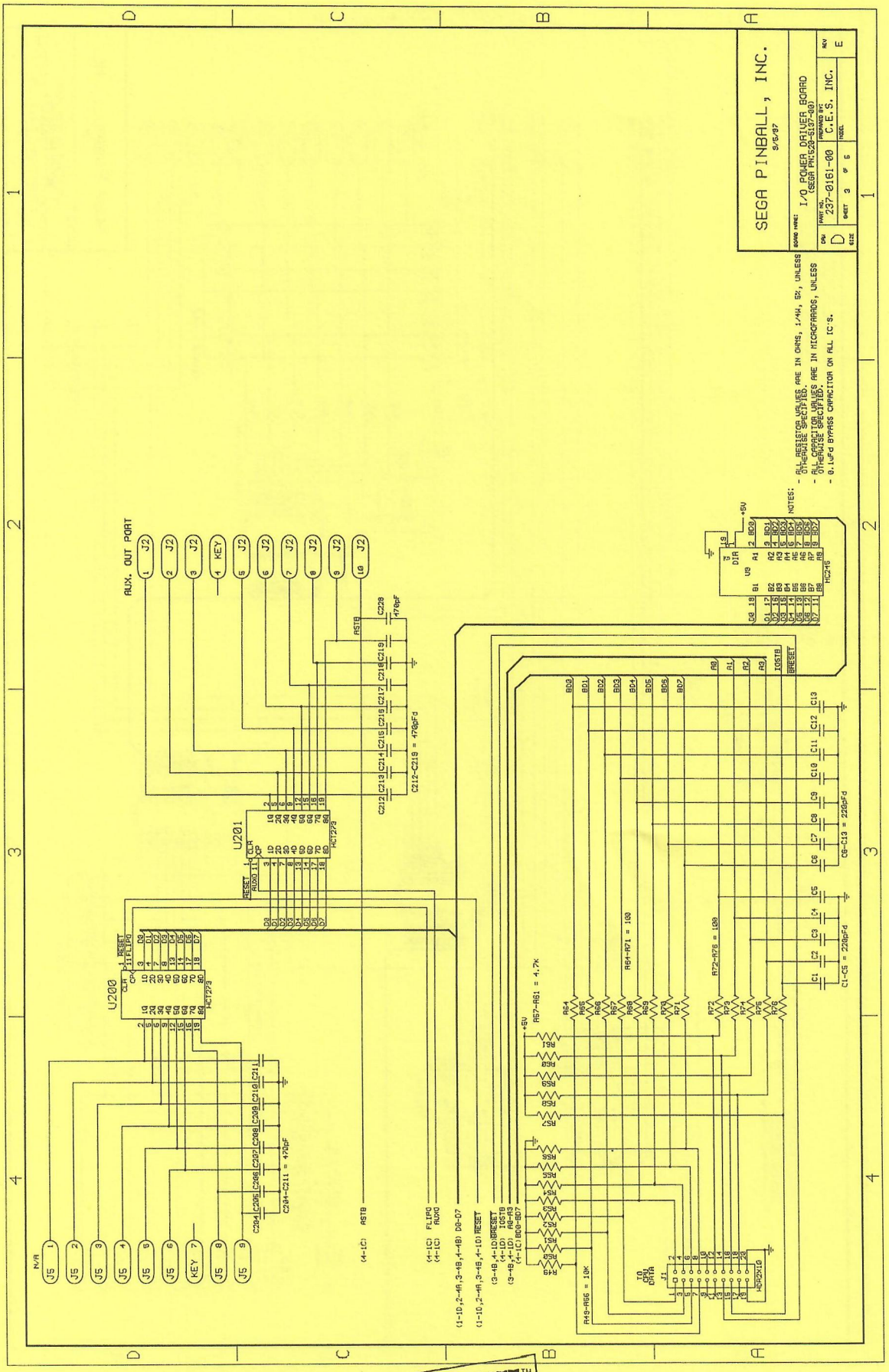
General Illumination (G.I.) Lights:
J15 has 6VAC switched on and off by a relay on the I/O Board. The relay is controlled by **Q200** which supplies power to the 24V coil winding to activate the relay. There are 4 taps on **J15** each fused at 5A for this 6VAC source.

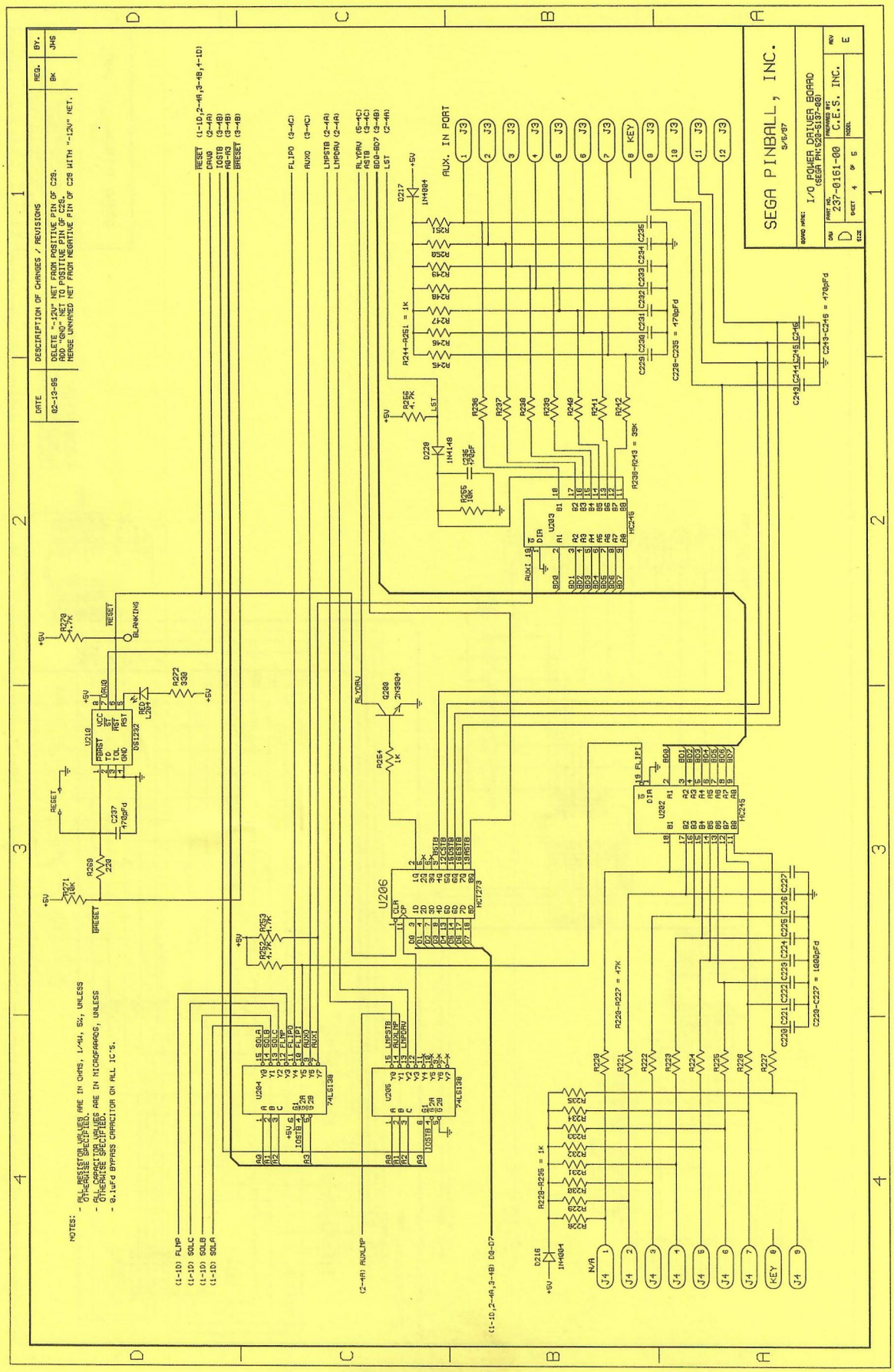


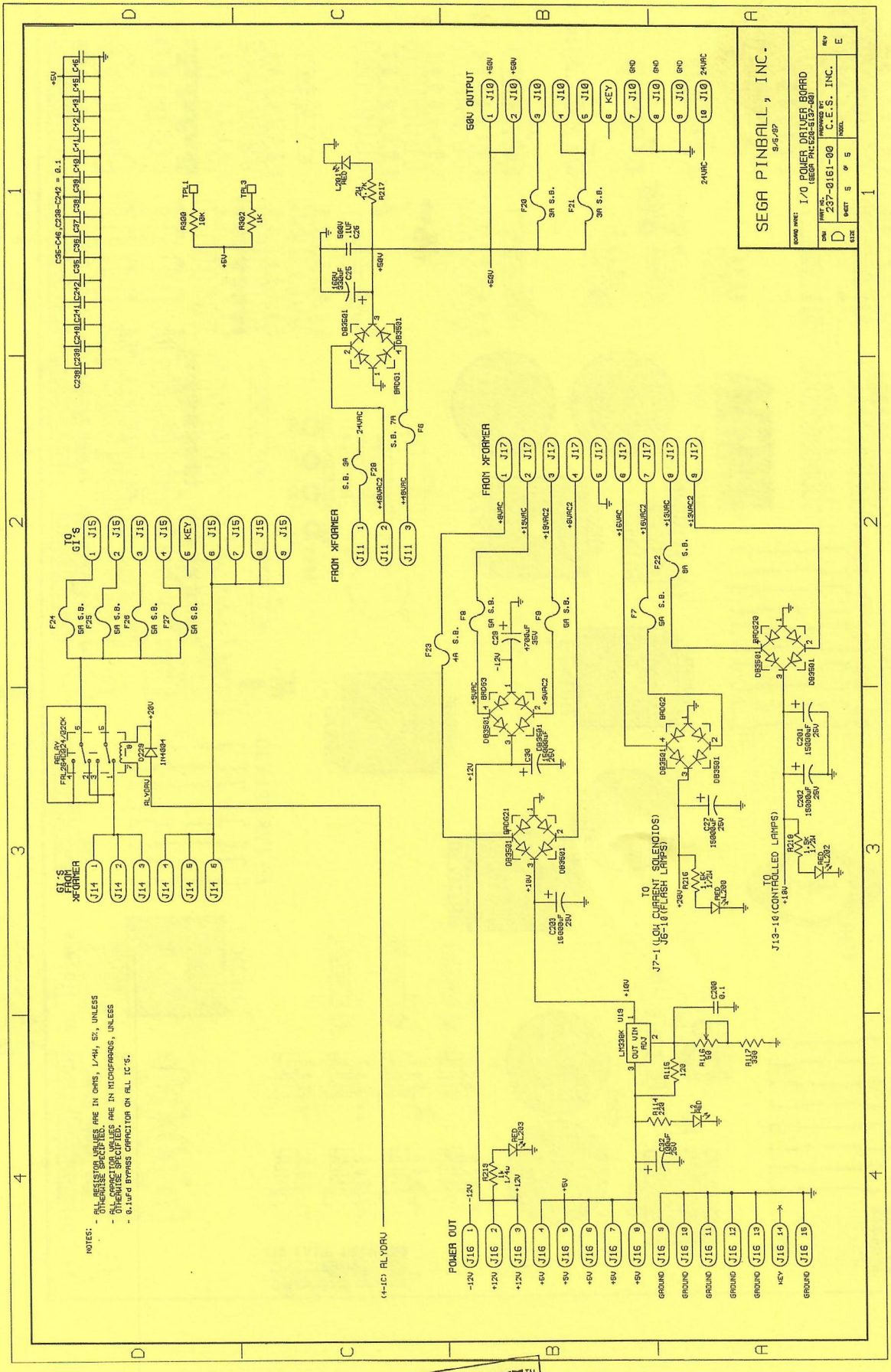

SEGA PINBALL, INC.
I/O POWER DRIVER BOARD
PART NO. 237-0161-00
C.E.S. INC.
FLASH LAMP DRIVERS
LOW CURRENT SOLENOIDS
HIGH CURRENT SOLENOIDS
NOTES:
- ALL RESISTOR VALUES ARE IN OHMS, 1/4W, 5%, UNLESS OTHERWISE SPECIFIED.
- ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
- 0.1uFd BYPASS CAPACITOR ON ALL IC'S.

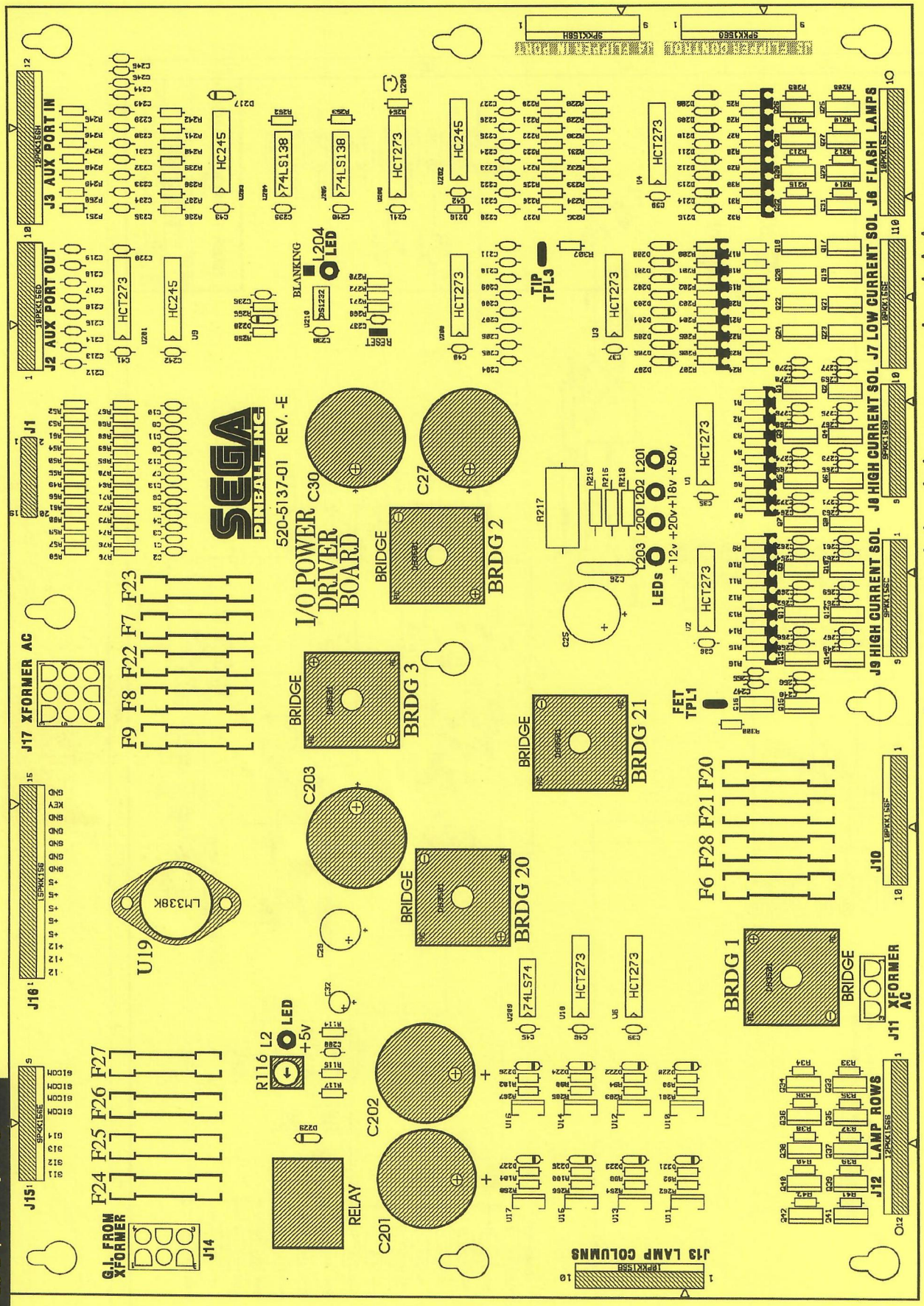

SEGA PINBALL, INC.
I/O POWER DRIVER BOARD
(SEGA PN:520-5137-00)
237-0161-00
C.E.S. INC.
SHEET 2 OF 5
LAMP RETURNS
LAMP DRIVERS
KEY
U6
U18
HCT273
74LS74A
NOTES:
- ALL RESISTOR VALUES ARE IN OHMS, 1/4W, 5%, UNLESS OTHERWISE SPECIFIED.
- ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
- 0.1uFd BYPASS CAPACITOR ON ALL IC'S.



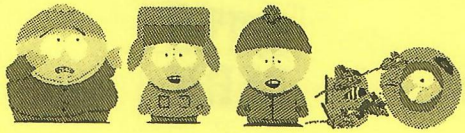

SEGA PINBALL, INC.
I/O POWER DRIVER BOARD
C.E.S. INC.
AUX. OUT PORT
U200
U201
HC273
HC245
HDR2X18
NOTES:
- ALL RESISTOR VALUES ARE IN OHMS, 1/4W, 5%, UNLESS OTHERWISE SPECIFIED.
- ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
- 0.1uFd BYPASS CAPACITOR ON ALL IC'S.


SEGA PINBALL, INC.
I/O POWER DRIVER BOARD
(SEGA PN:520-5137-00)
PART NO. 237-0161-00
PREPARED BY: C.E.S. INC.
SHEET 4 OF 5
REV E
DESCRIPTION OF CHANGES / REVISIONS
DELETE "-12V" NET FROM POSITIVE PIN OF C29.
ADD "GND" NET TO POSITIVE PIN OF C28.
MERGE UNNAMED NET FROM NEGATIVE PIN OF C29 WITH "-12V" NET.
AUX. IN PORT
U206
74HC273
74LS138
DS1232
HC245
2N3904
1N4004
1N4148
NOTES:
- ALL RESISTOR VALUES ARE IN OHMS, 1/4W, 5%, UNLESS OTHERWISE SPECIFIED.
- ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
- 0.1uF BYPASS CAPACITOR ON ALL IC'S.


SEGA PINBALL, INC.
I/O POWER DRIVER BOARD
(SEGA PN:520-6137-00)
PART NO: 237-0161-00
PREPARED BY: C.E.S. INC.
SIZE D
SHEET 5 OF 5
REV E
50V OUTPUT
FROM XFORMER
TO GI'S
GI'S FROM XFORMER
POWER OUT
TO J7-1 (LOW CURRENT SOLENOIDS) J6-1 (FLASH LAMPS)
TO J13-16 (CONTROLLED LAMPS)
(4-IC) RLYDRV
NOTES:
- ALL RESISTOR VALUES ARE IN OHMS, 1/4W, 5%, UNLESS OTHERWISE SPECIFIED.
- ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
- 0.1uFd BYPASS CAPACITOR ON ALL IC'S.



Section 5 | PCBs



I/O Power Driver Board Parts

ITEM	QTY	PART NUMBER	REF-DESIGNATOR	DESCRIPTION (NS = Not Stuffed)
—	1	520-5137-01	I/O Power Driver Board	Complete PCB Assembly
1	16	125-5027-00	C255>C262, C271>C278	0.1uF, (104), 100v, Cap.
2	22	125-5028-00	C204>C219, C228>C237, C243>C246	470pF, (471), Axial Cap. (C204>C211: NS)
3	16	125-5029-00	C247>C254, C263>C270	0.01uF, (103), 100v Cap.
4	13	125-5030-00	C7 C8 C9 C10 C11 C12 C13 C1 C2 C3 C4 C5 C6	220pF, (221), Cap.
5	0	n/a	C220>C227	(C220>C227: NS)
6	17	125-5031-00	C35>C43, C45, C46, C200, C238>C242	0.1uF, (104), Cap.
7	16	110-0106-00	Q1>Q16	20N10L STP, Transistor
8	32	121-5042-00	R1>R16, R200>R215	22K Ω 1/4W Res.
9	16	121-5003-00	R17>R32	620 Ω 1/4W Res.
10	17	121-5045-00	R33>R42, R236>R242	39K Ω 1/4W Res.
11	13	121-5007-00	R64>R76	100 Ω 1/4W Res.
12	8	121-5029-00	R90, R92, R94, R96, R98, R100, R102, R104	6.8K Ω 1/4W Res.
13	1	121-5030-00	R115	120 Ω 1/4W Res.
14	0	n/a	R220>R227	(R220>R227: NS)
15	9	121-5009-00	R228>R235, R245>R251, R254, R302	1K Ω 1/4W Res. (R228>R235: NS)
16	8	121-5032-00	R261>R268	47K Ω 1/4W Res.
17	2	121-5033-00	R114, R269	220 Ω 1/4W Res.
18	8	121-5021-00	R49, R57>R61, R252, R253, R256, R270	4.7K Ω 1/4W Res. (R252: NS)
19	11	121-5011-00	R50>R56, R255, R271, R300	10K Ω 1/4W Res.
20	2	121-5036-00	R117, R272	330 Ω 1/4W Res.
21	8	100-5012-00	U1>U4, U6, U18, U200, U201, U206	74HCT273 (U200: NS)
22	1	n/a	RESET	(RESET: NS)
23	1	121-5009-00	R219	1K Ω 1/4W Res.
24	2	121-5038-00	R216, R218	1.5K Ω 1/2W Res.
25	7	200-5000-01	F7>F9, F24>F27	5A 250v S.B. Fuse
26	1	200-5000-03	F6	7A 250v S.B. Fuse
27	1	200-5000-06	F23	4A 250v S.B. Fuse
28	1	200-5000-05	F22	8A 250v S.B. Fuse
29	3	200-5000-08	F20, F21, F28	3A 250v S.B. Fuse
30	1	045-5013-00	J15	9PKK156 (PIN 5=KEY)
31	1	045-5016-00	J16	15PKK156
32	1	100-5023-00	U210	DS1232
33	1	110-0069-00	Q200	2N3904, Transistor.
34	1	125-5032-00	C32	100uF, 25v, Radial Lytic Cap.
35	1	045-5015-01	J1	20-Pin, 0.1 Dual Row Header
36	1	100-0338-00	U202, U203	74HC245 (U202: NS)
37	10	110-0088-00	Q33>Q42	19N06L STP, Transistor
38	6	165-5099-00	**L2, L200>L204**	**LED T1-3/4 DIFFUSER LED**
39	1	045-5014-01	J2	10PKK156 (PIN 4=KEY)
40	1	121-5039-00	R116	50 Ω Pot
41	16	110-0067-00	Q17>Q32	TIP122
42	1	125-5033-00	C25	100uF, 150v, Radial Lytic Cap.
43	1	110-0058-00	U9	74LS245
44	1	125-5034-00	C29	4700uF, 35v, Radial Lytic Cap.
45	1	190-5002-00	RELAY	FRL264D024/02CK Relay
46	0	n/a	J5	(J5: NS)
47	1	100-0037-00	U209	74LS74
48	0	n/a	J4	(J4: NS)
49	2	100-0148-00	U204, U205	74LS138
50	1	125-5035-00	C26	.1UF, 500v, Ceramic Disk Cap.
51	1	100-0356-00	U19	LM338K
52	5	124-5000-00	BRDG1, BRDG2, BRDG3, BRDG20, BRDG21	DB3501
53	5	125-5036-00	C27, C30, C201>C203	15000uF, 25v, Radial Lytic Cap.
54	25	112-0054-00	D200>D215, D220>D227	1N4148, Diode
55	2	112-5003-00	D216, D217, D229	1N4004, Diode (D216: NS)
56	2	n/a	TPL1, TPL3	*Test Point Wire (24ga.) Loops*
57	1	045-5014-01	J7	10PKK156 (PIN 5=KEY)
58	1	045-5014-01	J6	10PKK156 (PIN 9=KEY)
59	8	110-0089-00	U10>U17	VN02N
60	1	045-0014-03	J11	10-84-4030 (3 PIN MOLEX)
61	1	045-5015-00	J12	12PKK156 (PIN 7=KEY)
62	1	045-0014-09	J17	10-84-4090 (9 PIN MOLEX)
63	1	n/a	BLANKING	*Test Point - Do Not Stuff*
64	1	121-5050-00	R217	4.7K Ω 2W Res. (SANDBAR)
65	1	045-5014-01	J13	10PKK156 (PIN 2=KEY)
66	1	045-0014-06	J14	10-84-4060 (6 PIN MOLEX)
67	1	045-5014-01	J10	10PKK156 (PIN 6=KEY)
68	1	045-5015-00	J3	12PKK156 (PIN 8=KEY)
69	1	045-5013-00	J9	9PKK156 (PIN 3=KEY)
70	1	045-5013-00	J8	9PKK156 (PIN 2=KEY)
71	26	205-0004-00	F6>F9, F20>F28	Fuse Clips
72	1	n/a	U19	Heatsink (5v Reg.)

CPU Section:

The CPU is a **68B09E** (**U209**) with up to 8 MBytes of CPU *Code Space* (**U210**). The CPU code is bank selected by the use of **U211** and each bank consists of 16 KBytes. 8 KBytes of RAM (**U212**) is available to the CPU. The RAM is battery backed and has a write protected area. Battery back up is accomplished by 3-AA Cells which have a **TEST POINT VB** to check the battery voltage status. The write protected area consists of 512 Bytes used for storing game settings. This section of **RAM** can only be written to when the coin door is open. The Coin Door switch comes into the CPU on **CN6-12** and is fed into the address decoding **PAL U213**. When this memory protect signal is low writes to the protected **RAM** area are prohibited. Address decoding for the system is accomplished by one **PAL U213** and one 1-of-8 decoder **U214**.

A watchdog is used to monitor the CPU and the 5V supply. If the 5V supply is below 4.75 the watchdog will hold the CPU/Sound Board & I/O Board in reset. The watchdog must be fed at a rate of ***250ms*** or faster. The signal used to feed the watchdog comes from the EPROM Bank select signal used to load **U211**. The CPU has a timer interrupt used as a heartbeat for the system this signal comes from counter **U2**. The clock for this counter is the **CPU Q CLOCK**. Clearing the timer interrupt is done by reading the ***DIP Switch***. The timer interrupt can be observed at **TEST POINT FIRQ**. In normal operation **"FIRQ"** should be toggling at a rate of *976Hz*.

The I/O Interface **CN1** is buffered by two (2) **HC245** Chips. The CPU's reset line is buffered by **Q10** and fed over to the I/O through **CN1**. An I/O strobe signal is feed through **CN1-15** and is used to notify the I/O that a valid address is being sent.

Switches:

The Switch Matrix consists of eight (8) **2N3904** Transistors which pull one of 8 strobes 'low' to *activate* a Single Column of switches. The *Switch Return Signals* are fed into **CN7** [SWITCH ROWS] and are highly filtered and compared to a 2.5v *reference voltage*. The *Switch Return Voltage* must be below 2.5v to make a *Valid Switch Closure*. If *false switches* are appearing, check that none of the **2N3904** Transistors are permanently pulling the *strobe line low*. Only one strobe from **CN5** [SWITCH COLUMNS] should be *low at any time*. **CN6** [DEDICATED SWITCH IN] is a *Dedicated Bank of Input Switches*. Switches connected to **CN6** are connected to ground instead of a strobe and may be read at any time.

Plasma Interface:

The data path for communication to and from the Plasma Controller Board is 8 bits wide. There are separate *Input* and *Output Busses*. The *Input Bus* from the Plasma Controller to the CPU/Sound Board comes in on **CN8** [PLASMA CONTROL]-**Pins 3-10** and is fed into **U200** for input to the CPU's *Data Bus*. Data going out to the controller comes from the CPU's *Data Bus* through **U201** and onto **CN8-Pins 11-18**. Status back from the Plasma Controller comes in on **CN8-Pins 22-26** and is fed into **U202** for input to the CPU's *Data Bus*. Two control signals that go out to the Plasma Controller are **PRES** [PLASMA RESET] and **CN8-Pin 19** [**PSTB** - *Plasma Strobe*]. The Plasma Reset is software controllable through **U216/B** and also has a test point "Plasma Reset". The *Plasma Strobe Signal* to the controller is generated from **U216/A** and is *used to latch data* into the Plasma Controller.

Sound Section:

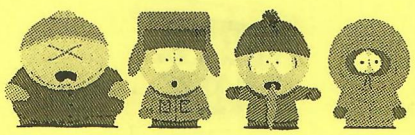
The audio section consists of a **BSMT SOUND CHIP U9** Sound (Voice) EPROMs (**U17 U21 U36 U37**) **68B09E U6** and Sound Code **EPROM U7**. The **BSMT** latches sound EPROM addresses in **U13** & **U12** for output to the Sound EPROMs. Sound Data from the EPROMs is read through **U19** to the **BSMT**. The EPROMs are bank selected by **U22**. When the **BSMT** has sound data to be played out to the speakers it loads 16 bits into a 16 bit shift register made up of **U24** & **U23**. The data stream from the shift register is serially shifted into a stereo 16 bit *Digital to Analog Converter* (**DAC**). When the system is operating properly the ws (word select) input of the **DAC** will be toggling. The ws input is used to latch the right and left channel sound data into the **DAC**. If the ws line is not oscillating no analog signal will come out of the **DAC**. The **DAC** outputs are a controlled current source. These outputs are converted to a voltage by an operational amplifier **U30** to form the analog signal. **TEST POINTS AOR** and **AOL** are the outputs of the operational amplifier. These outputs are then fed directly into three power amplifiers (**TDA2030A**) or optionally into an analog volume control chip **U35** for a potentiometer volume control. The analog section has its own +5V & -5V derived from **VR1** & **VR2**. These separate supply voltages are for the **DAC U26** Operational Amplifier **U30** and analog volume control **U35**.

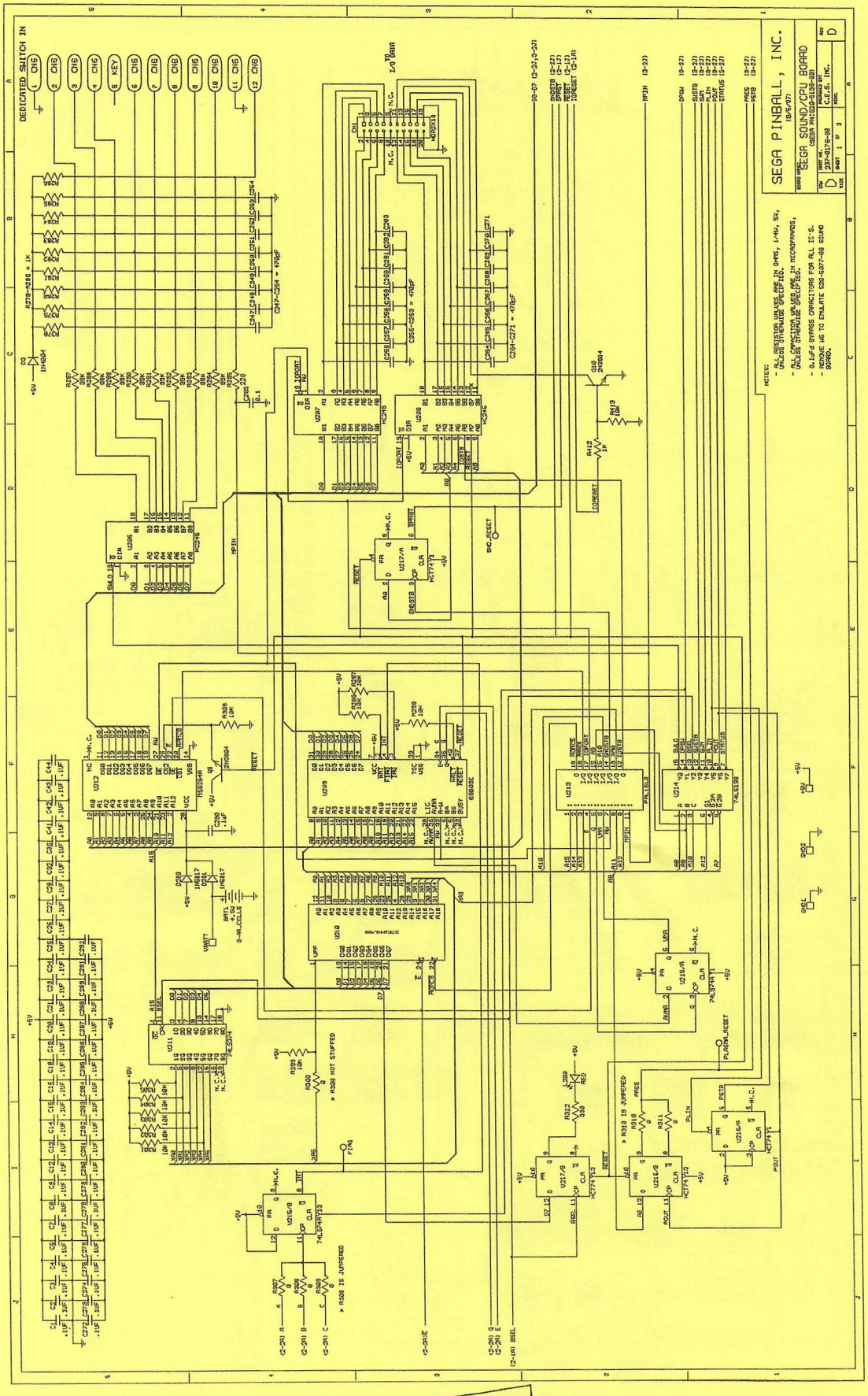
Sound calls are made from the **CPU's 68B09E U200** to the sound section by latching data into **U5**. The sound section's **CPU 68BO9E (U6)** reads in this data and handles the interfacing to the **BSMT**.

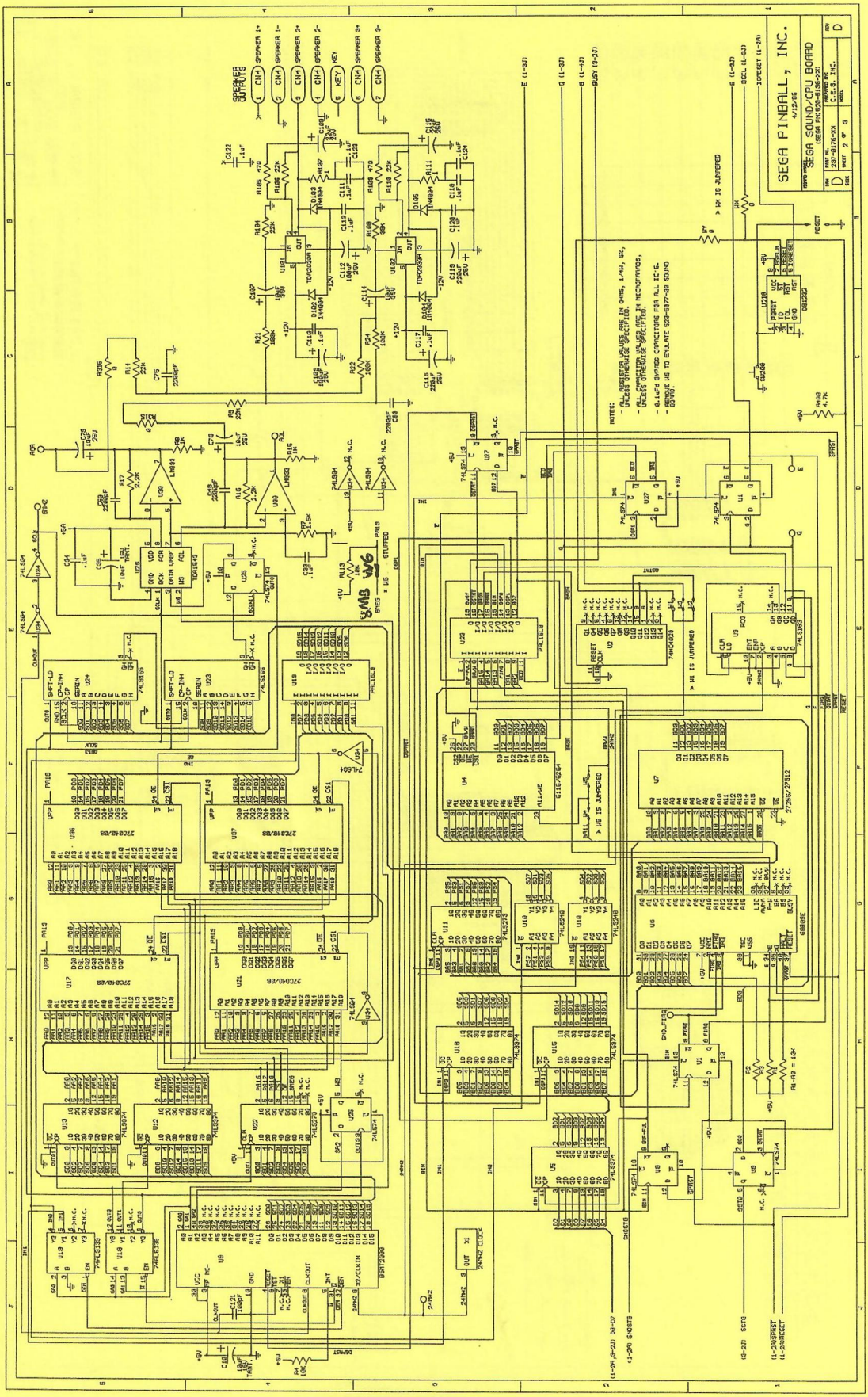
Other Test Points:

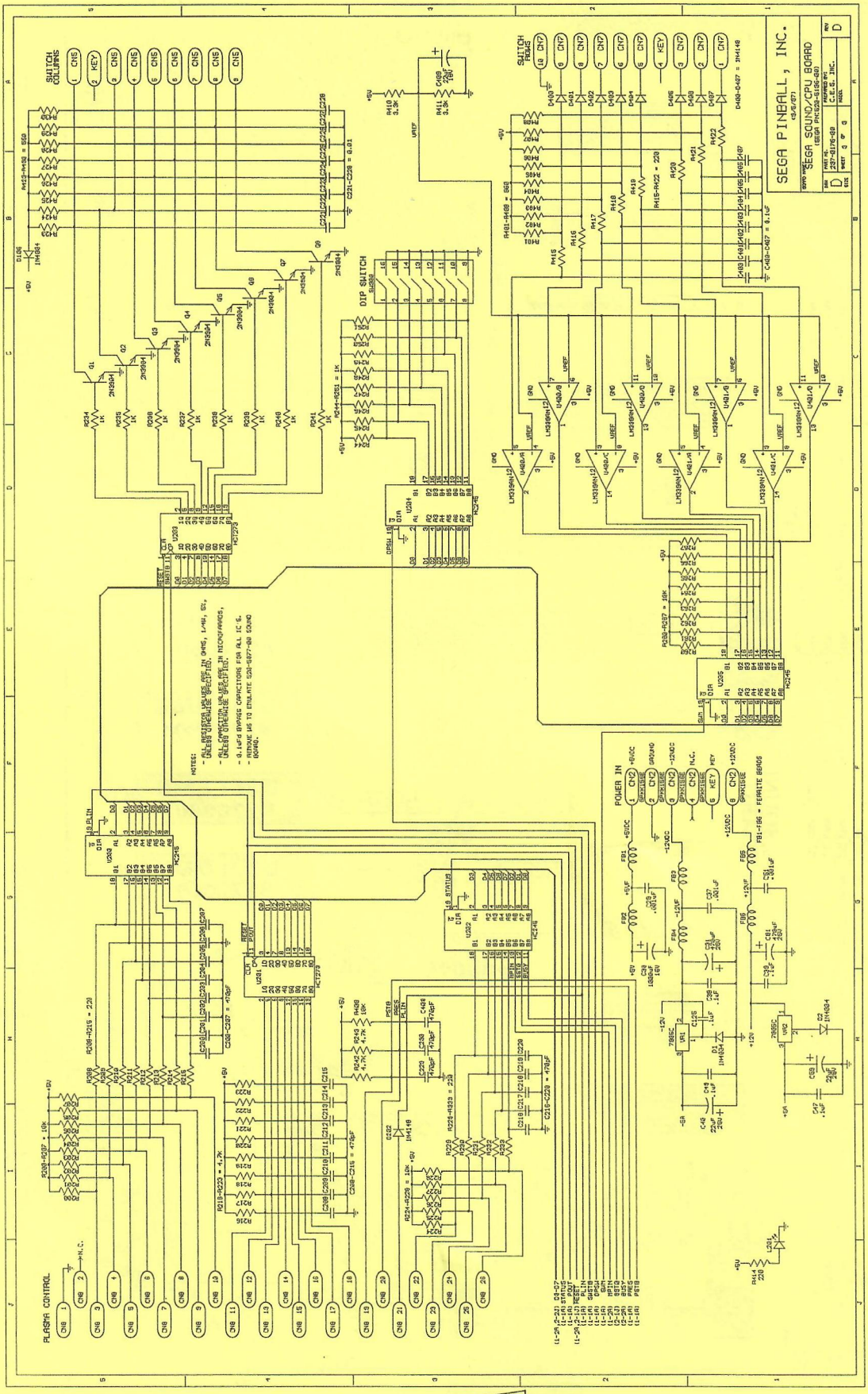
E & **Q** - The CPU signals for both **68B09E** processors. Should be at 2Mhz with **Q** leading **E** by ***500 nsec***.
24Mhz - The oscillator used for the **BSMT** & derivation of **E** & **Q**.
SND-FIRQ - The sound sections CPU interupt.
6Mhz - This clock is generated internally on the **BSMT** and is used for shifting the data samples into th **DAC**.

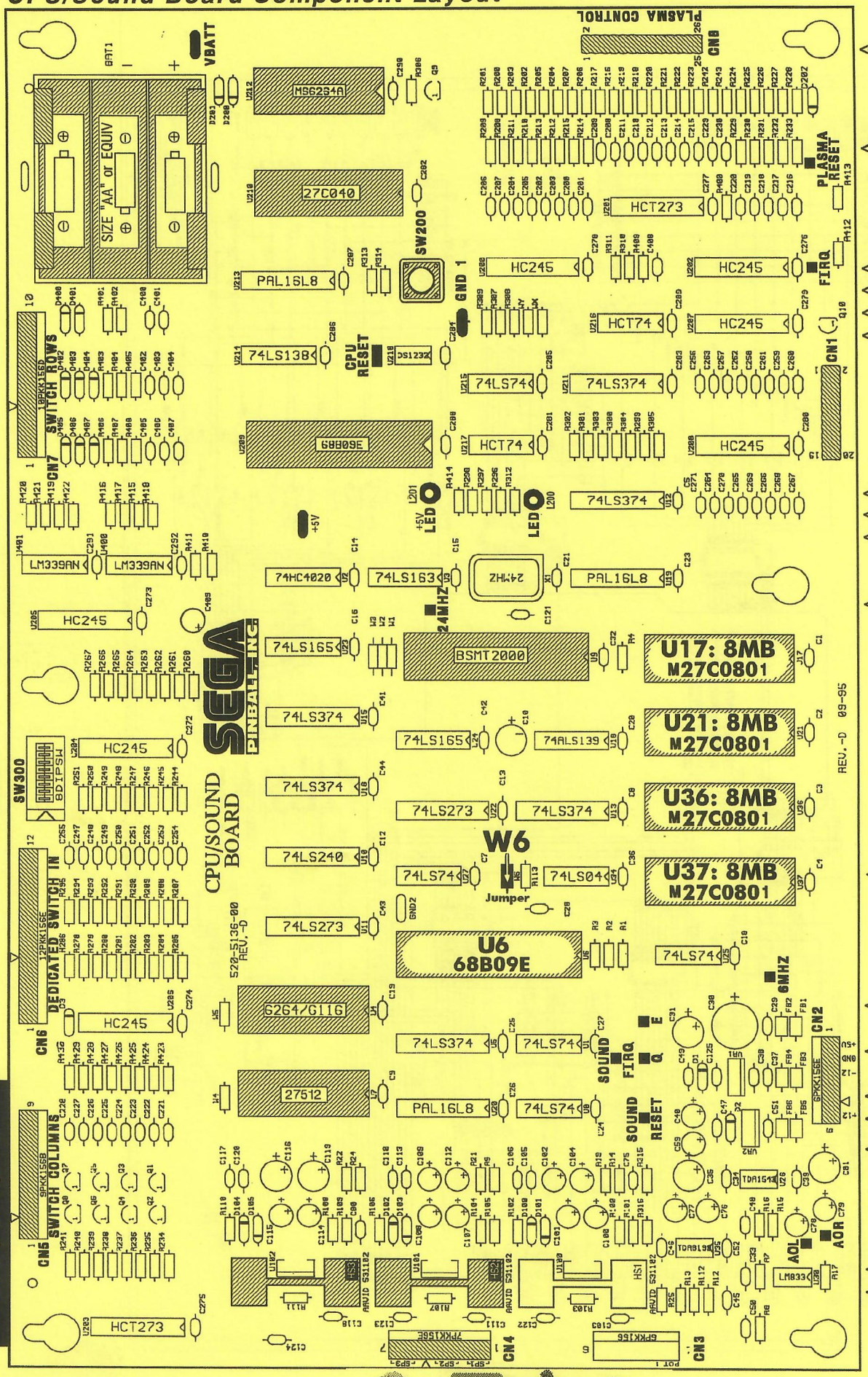
W6 Jumper - This jumper must be installed for games that use **8MB**Sound EPROMs (**U17 U21 U36 U37**). For games which use **4MB** Sound EPROMs this jumper is not installed but will operate on boards with W6 installed.




SEGA PINBALL, INC.
SEGA SOUND/CPU BOARD
DEDICATED SWITCH IN
NOTES:


SEGA PINBALL, INC.
SEGA SOUND/CPU BOARD
SPEAKER OUTPUTS
NOTES:
- ALL RESISTOR VALUES ARE IN OHMS, 1/4W, 5%, UNLESS OTHERWISE SPECIFIED.
- ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
- 0.1uFd BYPASS CAPACITORS FOR ALL IC'S.
- REFER TO SYSTEM 11 SOUND BOARD.


SEGA PINBALL, INC.
SEGA SOUND/CPU BOARD
SWITCH COLUMNS
SWITCH RETURNS
DIP SWITCH
POWER IN
FLASH CONTROL



TEST POINTS:

- VBATT
- PLASMA RESET
- FIRQ
- SW200
- GROUND 1
- CPU RESET
- L201 LED+5v
- L200 LED
- +5v
- 24 Mhz
- W6 requires a Jumper if using 8MB EPROMs in U17, U21, U36 and/or U37
- 6 Mhz
- E
- SOUND FIRQ
- Q
- SOUND RESET
- AOR
- AOL

CPU/Sound Board Parts

ITEM	QTY	PART NUMBER	REF-DESIGNATOR	DESCRIPTION (NS = Not Stuffed)
—	1	520-5136-16	CPU/Sound Board Mono (FCC FEB98)	Complete PCB Assembly
1	1	124-5001-00	VR2	LM7805CT +5v Regulator
2	5	121-5051-00	R12, R13, R19, R21, R22, R24	100K Ω 1/4W Res. (R19: NS)
3	2	121-5009-00	R103, R107, R111	1K Ω 1/4W Res. (R103: NS)
4	38	121-5011-00	R1>R4, R113, R200>R207, R224>R228, R244>R251, R260>R267, R296>R299, R301>R306, R409, R413	10K Ω 1/4W Res. (R200>R207, R409, R413: NS)
5	5	121-5023-00	R9, R14, R100, R102, R104, R106, R110	22K Ω 1/4W Res. (R100, R102: NS)
6	20	121-5009-00	R15, R8, R234>R241, R278>R286, R412	1K Ω 1/4W Res.
7	4	121-5043-00	R16, R17, R25, R112	2.2K Ω 1/4W Res.
8	1	121-5018-00	R7	1.5K Ω 1/4W Res.
9	2	121-5046-00	R101, R105, R109	470K Ω 1/4W Res. (R101: NS)
10	9	121-5045-00	R108, R287>R294	39K Ω Res.
11	1	121-5036-00	R312	330 Ω 1/4W Res.
12	12	n/a	R300, R308>R311, R313>R316, WX, WY	0Ω *Jumper Wire (24ga.)*
13	15	121-5033-00	R208>R215, R229>R233, R414>R422	220 Ω 1/4W Res. (R208>R215: NS)
14	11	121-5021-00	R216>R223, R242, R243, R400	4.7K Ω 1/4W Res.
15	16	121-5047-00	R401>R408, R423>R430	560 Ω 1/4W Res.
16	2	121-5048-00	R410, R411	3.3K Ω 1/4W Res.
17	1	100-0049-00	U3	74LS163
18	1	(See Pg. **DR.** ❸ Table)	U7	27512 EPROM
19	1	045-5015-07	CN4	7PKK156 (PIN5=KEY)
20	1	Not Used	RESET	*Do Not Stuff*
21	5	(See Pg. **DR.** ❸ Table)	U17, U21, U36, U37, U210	27C040 EPROM
22	2	100-5008-00	U23, U24	74LS165
23	4	125-5017-00	C76>C79	10uF, 25v, Radial Lytic Cap.
24	4	125-5020-00	C40, C59, C101, C108, C115	22uF, 25v, Radial Lytic Cap. (C101: NS)
25	2	125-5017-00	C100, C10,7 C114	10uF, 35v, Radial Lytic Cap. (C100: NS)
26	2	125-5015-00	C102, C104, C109, C112	100uF, 25v, Rad. Ltc. Cap. (C102, C104: NS)
27	1	125-5014-00	C409	22uF, 16v, Radial Lytic Cap.
28	1	100-5016-00	U35	TDA1899
29	1	125-5037-00	C30	1000uF, 16v, Radial Lytic Cap.
30	1	100-0027-00	U34	74LS04
31	1	100-0043-00	U18	74ALS139
32	6	100-0064-00	U5, U12, U13, U15, U16, U211	74LS374
33	1	100-0249-00	U2	74HC4020
34	1	100-0149-00	U10	74LS240
35	6	n/a	W1>**W6** (Jumper required @ W6 if using 8MB EPROMs)	0Ω *Jumper Wire (24ga.)*
36	2	125-5019-00	C31, C81	470uF, 25v, Radial Lytic Cap.
37	2	125-5017-00	C10, C35	10uF, 16v, Radial Tant. Cap.
38	2	125-5012-00	C116, C119	220uF, 25v, Radial Lytic Cap.
39	1	045-5015-06	CN2	6PKK156 (PIN 5=KEY)
40	1	140-0011-00	X1	24Mhz
41	1	105-0116-00	U9	BSMT2000
42a	1	965-0136-00	**U19 - YELLOW DOT**	PAL16L8 (Programmed) - **YELLOW DOT**
42b	1	965-0137-00	**U20 - WHITE DOT**	PAL16L8 (Programmed) - **WHITE DOT**
42c	1	965-6504-00	**U213- BLUE DOT**	PAL16L8 (Programmed) - **BLUE DOT**
43	5	100-0037-00	U1, U8, U25, U27, U215	74LS74
44	3	125-5043-00	C29, C37, C51	0.001uF, (102), Cap.
45	79	125-5031-00	C1>C5, C7>C9, C12>C16, C18>C21, C23>C26, C28, C32>C34, C36, C38, C39, C41>C47, C49, C52, C102 C103, C105, C106, C110, C111, C113, C117, C118, C120, C122>C125, C255, C272>C292, C400>C407	0.1uF, (104), Axial Cer. Cap. (C102, C103, C105, C106: NS)
46	1	125-5038-00	C121	100pF, (101), Cap.
47	4	125-5039-00	C48, C50, C75, C80	0.0022uF, (222), Cap.
48	39	125-5028-00	C200>C220, C229, C230, C247>C254, C256>C271	470pF, (471), Cer. Cap. (C200>C207: NS)
49	8	125-5029-00	C221>C228, C408	0.01uF, (103), 100v Cap. (C408: NS)
50	1	045-5015-06	CN3	6PKK156
51	1	100-0375-00	U30	LM833
52	2	100-0022-00	U22 U11	74LS273
53	7	112-5003-00	D1>D3, D100>D105	1N4004, Diode (D100, D101: NS)
54	2	112-5008-00	D200, D201	1N5817, Diode
55	8	112-0054-00	D202, D400>D407	1N4148, Diode (D202: NS)
56	1	124-5002-00	VR1	LM7905CT -5v Regulator
57	2	100-5016-20	U100>U102	TDA2030V (U100: NS)
58	1	100-5018-00	U26	TDA1543
59	1	n/a	SW200	B3F4000
60	1	165-5099-00	**L200**	**LED T1-3/4 DIFFUSER LED**
61	1	165-5099-00	**L201**	**LED T1-3/4 DIFFUSER LED**
62	2	100-5015-00	U216, U217	HCT74
63	1	100-0148-00	U214	74LS138
64	1	105-0046-00	U212	MS6264A
65	1	100-0189-01	U6, U209	68B09E
66	1	545-5685-00	BAT1 BATTERY HOLDER	3-AA CELLS 4.5v
67	1	045-5015-01	CN1	20-Pin, 0.1 HEADER
68	10	n/a	6MHZ AOR Q AOL 24MHZ	*Test Points* - NS
69	10	110-0069-00	Q1>Q10	2N3904, Transistor
70	1	045-5013-00	CN5	9PKK156 (PIN 2=KEY)
71	2	100-5012-00	U201, U203	74HCT273
72	6	100-0338-00	U200, U202, U204>U208	74HC245 (U200: NS)
73	1	100-5023-00	U218	DS1232
74	1	045-5015-26	CN8	26-Pin, 0.1 HEADER
75	1	045-5014-01	CN7	10PKK156 (PIN 4=KEY)
76	4	n/a	VBATT +5V GND1, GND2	*Test Point Wire (24ga.) Loops*
77	1	045-5015-00	CN6	12PKK156 (PIN 5=KEY)
78	1	181-5002-00	SW300	8-Pin, Dip Switch
79	2	100-0377-00	U400, U401	LM339AN
80	1	105-0052-05	U4	6116 RAM
81	3	535-5000-10	U100>U102	AAVID 531102
82	3	077-5209-00	U6, U9, U209	40-Pin, IC Socket
83	5	077-5217-00	U17, U21, U36, U37, U210	32-Pin, IC Socket
84	3	077-5208-00	U4, U7, U212	28-Pin, IC Dip Socket
85	1	n/a	U1 (@ Pins 5 & 6)	100pF, Cap.

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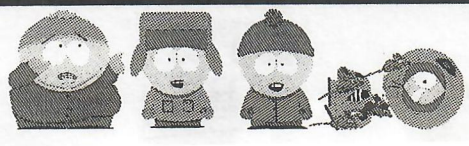
APPENDIX A
Pinball Game Firmware Table

EPROM	Chip Size	Program Part Nº	USA Ver.	Bd. Loc.	Raw Part Nº
Laser War					
CPU	(256K)	965-0004-00		C5	960-5007-00
Sound (Old)	(256K)	965-0005-00		J5	960-5007-00
Sound (Old)	(256K)	965-0006-00		J6	960-5007-00
Sound (Old)	(256K)	965-0007-00		J7	960-5007-00
		- OR -			
Sound	(256K)	965-0008-00		7F	960-5007-00
Sound 1	(512K)	965-0009-00		6F	960-7001-02
Sound 2	(512K)	965-0010-00		4F	960-7001-02
Secret Service					
CPU	(256K)	965-0011-00	A-6	B5	960-5007-00
CPU	(256K)	965-0012-00	A-6	C5	960-5007-00
Voice 1	(512K)	965-0014-00		6F	960-7001-02
Voice 2	(512K)	965-0015-00		4F	960-7001-02
Sound	(256K)	965-0013-00		7F	960-5007-00
Torpedo Alley					
CPU	(256K)	965-0016-00	A02-1	B5	960-5007-00
CPU	(256K)	965-0017-00	A02-1	C5	960-5007-00
Voice 1	(512K)	965-0019-00		6F	960-7001-02
Voice 2	(512K)	965-0020-00		4F	960-7001-02
Sound	(256K)	965-0018-00		7F	960-5007-00
Time Machine					
CPU	(128K)	965-0021-00	A02-3	B5	960-5007-00
CPU	(256K)	965-0022-00	A02-3	C5	960-5007-00
Voice 1	(512K)	965-0024-00		6F	960-7001-02
Voice 2	(512K)	965-0025-00		4F	960-7001-02
Sound	(256K)	965-0023-00		7F	960-5007-00
Playboy 35th Anniversary					
CPU	(256K)	965-0046-00	A02-3	B5	960-5007-00
CPU	(256K)	965-0047-00	A02-3	C5	960-5007-00
Voice 1	(512K)	965-0049-00		6F	960-7001-02
Voice 2	(512K)	965-0050-00		4F	960-7001-02
Sound	(256K)	965-0048-00		7F	960-5007-00
ABC Monday Night Football					
CPU	(256K)	965-0031-00	A02-7	B5	960-5007-00
CPU	(256K)	965-0032-00	A02-7	C5	960-5007-00
Voice 1	(512K)	965-0034-00		6F	960-7001-02
Voice 2	(512K)	965-0035-00		4F	960-7001-02
Sound	(256K)	965-0033-00		7F	960-5007-00
Robocop					
CPU	(256K)	965-0036-00	A03-4	B5	960-5007-00
CPU	(256K)	965-0037-00	A03-4	C5	960-5007-00
Voice 1	(512K)	965-0039-00		6F	960-7001-02
Voice 2	(512K)	965-0040-00		4F	960-7001-02
Sound	(256K)	965-0038-00		7F	960-5007-00
Phantom of the Opera					
CPU	(256K)	965-0026-00	A03-2	B5	960-5007-00
CPU	(256K)	965-0027-00	A03-2	C5	960-5007-00
Voice 1	(512K)	965-0029-00		6F	960-7001-02
Voice 2	(512K)	965-0030-00		4F	960-7001-02
Sound	(256K)	965-0028-00		7F	960-5007-00
Back to the Future					
CPU	(256K)	965-0041-00	A02-0	B5	960-5007-00
CPU	(256K)	965-0042-00	A02-0	C5	960-5007-00
Voice 1	(512K)	965-0044-00		6F	960-7001-02
Voice 2	(512K)	965-0045-00		4F	960-7001-02
Sound	(256K)	965-0043-00		7F	960-5007-00
The Simpsons					
CPU	(256K)	965-0051-00	A02-7	B5	960-5007-00
CPU	(256K)	965-0052-00	A02-7	C5	960-5007-00
Voice 1	(512K)	965-0054-00		6F	960-7001-02
Voice 2	(512K)	965-0055-00		4F	960-7001-02
Sound	(256K)	965-0053-00		7F	960-5007-00
Checkpoint					
CPU	(256K)	965-0056-00	A1-7	B5	960-5007-00
CPU	(256K)	965-0134-00	A1-7	C5	960-5007-00
Voice 1	(1M)	965-0057-00		F7	960-5009-00
Voice 2	(1M)	965-0058-00		F5	960-5009-00
Sound	(256K)	965-0059-00		F4	960-5007-00
Display	(512K)	965-0060-00	CP80	U8	960-7001-02
Teenage Mutant Ninja Turtles					
CPU	(256K)	965-0061-00	A1.04	B5	960-5007-00
CPU	(256K)	965-0062-00	A1.04	C5	960-5007-00
Voice 1	(1M)	965-0063-00		F5/6	960-5009-00
Voice 2	(1M)	965-0064-00		F4/5	960-5009-00
Sound	(256K)	965-0065-00		F7	960-5007-00
Display	(512K)	965-0066-00	A1.04	U8	960-7001-02
Batman					
CPU	(128K)	965-0067-00	A1.06	B5	960-5006-00
CPU	(256K)	965-0135-00	A1.06	C5	960-5007-00
Voice 1	(2M)	965-0068-00		U17	960-5010-00
Voice 2	(1M)	965-0069-00		U21	960-5009-00
Sound	(256K)	965-0070-00		U7	960-5007-00
Display	(1M)	965-0071-00	A1.06	U8	960-5009-00
Star Trek 25th Anniversary					
CPU	(512K)	965-0072-00	A2.01	C5	960-7001-02
Voice 1	(2M)	965-0073-00		U17	960-5010-00
Voice 2	(2M)	965-0074-00		U21	960-5010-00
Sound	(256K)	965-0075-00		U7	960-5007-00
Display	(1M)	965-0076-00	A1.09	U8	960-5009-00
Hook					
CPU	(512K)	965-0077-00	A4.08	C5	960-7001-02
Voice 1	(2M)	965-0078-00		U17	960-5010-00
Voice 2	(2M)	965-0079-00		U21	960-5010-00
Sound	(256K)	965-0080-00		U7	960-5007-00
Display	(1M)	965-0081-00	A4.01	U8	960-5009-00

EPROM	Chip Size	Program Part Nº	USA Ver.	Bd. Loc.	Raw Part Nº
Lethal Weapon 3					
CPU	(512K)	965-0082-00	A2.07	C5	960-7001-02
Voice 1	(2M)	965-0083-00		U17	960-5010-00
Voice 2	(2M)	965-0084-00		U21	960-5010-00
Sound	(256K)	965-0085-00		U7	960-5007-00
Display	(2M)	965-0086-00	A2.06	ROM 0	960-5010-00
Display	(2M)	965-0087-00	A2.06	ROM 1	960-5010-00
	(Used on Display PCB 520-5055-00)				
		-OR-			
Display	(4M)	965-0087-04	A2.06	ROM 0	960-5015-00
	(Used on Display PCB 520-5055-01)				
Star Wars					
CPU	(512K)	965-0119-00	A1.03	C5	960-7001-02
Voice 0	(4M)	965-0132-00		U17	960-5015-00
Voice 1	(2M)	965-0133-00		U21	960-5010-00
Sound	(256K)	965-0131-00		U7	960-5007-00
Display	(2M)	965-0120-00	A1.04	ROM 0	960-5010-00
Display	(2M)	965-0121-00	A1.04	ROM 1	960-5010-00
	(Used on Display PCB 520-5055-00)				
		-OR-			
Display	(4M)	965-0122-00	A1.05	ROM 0	960-5015-00
	(Used on Display PCB 520-5055-01)				
Rocky & Bullwinkle & Friends					
CPU	(512K)	965-0138-00	A1.30	C5	960-7001-02
Voice 0	(4M)	965-0139-00		U17	960-5015-00
Voice 1	(2M)	965-0140-00		U21	960-5010-00
Sound	(256K)	965-0141-00		U7	960-5007-00
Display	(4M)	965-0142-00	A1.30	ROM 0	960-5015-00
Jurassic Park					
CPU	(512K)	965-0143-00	A5.13	C5	960-7001-02
Voice 0	(4M)	965-0144-00		U17	960-5015-00
Voice 1	(2M)	965-0145-00		U21	960-5010-00
Sound	(256K)	965-0146-00		U7	960-5007-00
Display	(4M)	965-0147-00	A5.10	ROM 0	960-5015-00
Last Action Hero					
CPU	(512K)	965-0148-00	A1.12	C5	960-7001-02
Voice 0	(4M)	965-0149-00		U17	960-5015-00
Voice 1	(2M)	965-0150-00		U21	960-5010-00
Sound	(256K)	965-0151-00		U7	960-5007-00
Display	(4M)	965-0152-00	A1.06	ROM 0	960-5015-00
Tales from the Crypt					
CPU	(512K)	965-0157-00	A3.03	C5	960-7001-02
Voice 0	(4M)	965-0158-00		U17	960-5015-00
Voice 1	(2M)	965-0159-00		U21	960-5010-00
Sound	(256K)	965-0160-00		U7	960-5007-00
Display	(4M)	965-0161-00	A3.01	ROM 0	960-5015-00
The Who's Tommy					
CPU	(512K)	965-0162-00	A4.00	C5	960-7001-02
Voice 1	(4M)	965-0165-00		U17	960-5015-00
Voice 2	(4M)	965-0166-00		U21	960-5015-00
Voice 3	(4M)	965-0167-00		U36	960-5015-00
Voice 4	(4M)	965-0168-00		U37	960-5015-00
Sound	(512K)	965-0164-00		U7	960-7001-02
Display	(4M)	965-0163-00	A4.00	ROM 0	960-5015-00
WWF Royal Rumble					
CPU	(512K)	965-0169-00	A1.06	C5	960-7001-02
Voice 1	(4M)	965-0172-00		U17	960-5015-00
Voice 2	(4M)	965-0173-00		U21	960-5015-00
Voice 3	(4M)	965-0174-00		U36	960-5015-00
Sound	(512K)	965-0171-00		U7	960-7001-02
Display	(4M)	965-0170-00	A1.02	ROM 0	960-5015-00
Guns N' Roses					
CPU	(512K)	965-0175-00	A3.00	C5	960-7001-02
Voice 1	(4M)	965-0178-00		U17	960-5015-00
Voice 2	(4M)	965-0179-00		U21	960-5015-00
Voice 3	(4M)	965-0180-00		U36	960-5015-00
Voice 4	(4M)	965-0181-00		U37	960-5015-00
Sound	(512K)	965-0177-00		U7	960-7001-02
Display	(4M)	965-0176-00	A3.00	ROM 0	960-5015-00
Maverick *					
CPU	(512K)	965-0182-00	A4.04	C5	960-7001-02
Voice 1	(4M)	965-0186-00		U17	960-5015-00
Voice 2	(4M)	965-0187-00		U21	960-5015-00
Voice 3	(4M)	965-0187-01		U36	960-5015-00
Sound	(512K)	965-0185-00		U7	960-7001-02
Display*	(4M)	965-0183-00	A4.01	ROM 0	960-5015-00
Display*	(4M)	965-0184-00	A4.01	ROM 3	960-5015-00
Mary Shelley's Frankenstein *					
CPU	(512K)	965-0188-00	A1.03	C5	960-7001-02
Voice 1	(4M)	965-0192-00		U17	960-5015-00
Voice 2	(4M)	965-0193-00		U21	960-5015-00
Voice 3	(4M)	965-0194-00		U36	960-5015-00
Sound	(512K)	965-0191-00		U7	960-7001-02
Display*	(4M)	965-0189-00	A1.03	ROM 0	960-5015-00
Display*	(4M)	965-0190-00	A1.03	ROM 3	960-5015-00
Baywatch *		(CPU Board 520-5003-04)			
CPU	(512K)	965-0195-00	A4.00	C5	960-7001-02
Voice 1	(4M)	965-0196-00		U17	960-5015-00
Voice 2	(4M)	965-0197-00		U21	960-5015-00
Sound	(512K)	965-0199-00		U7	960-7001-02
Display*	(4M)	965-0200-00	A4.00	ROM 0	960-5015-00
Display*	(4M)	965-0201-00	A4.00	ROM 3	960-5015-00
Batman Forever *		(CPU Board 520-5003-04)			
CPU	(512K)	965-0202-00	A3.02	C5	960-7001-02
Voice 1	(4M)	965-0203-00		U17	960-5015-00
Voice 2	(4M)	965-0204-00		U21	960-5015-00
Sound	(512K)	965-0205-00		U7	960-7001-02
Display*	(4M)	965-0206-00	A3.00	ROM 0	960-5015-00
Display*	(4M)	965-0207-00	A3.00	ROM 3	960-5015-00

* ***Note:*** *Display* ***EPROMS (4M)*** *for* ***Maverick*** *thru* ***Batman Forever*** *require an access time of* ***120 Nsec*** *or faster.*



APPENDIX A
Pinball Game Firmware (for White Star Board System) Table

Apollo 13

ROM	Chip Size	Program Part №	USA Ver. I ✓Sum	Bd. Loc.	Raw Part №
CPU / Sound Board: 520-5136-00 (Stereo)					
Game ROM	(1M)	965-0208-00	A5.01 I $09FF	U210	960-5009-00
Voice 1	(4M)	965-0209-00		U17	n/a (masked)
Voice 2	(4M)	965-0210-00		U21	n/a (masked)
Voice 3	(4M)	965-0211-00		U36	n/a (masked)
Sound	(512K)	965-0212-00		U7	960-7001-02
Display Controller Bd.: 520-5055-01					
Display	(4M)	965-0213-00	A5.00 I $B92B	ROM 0	960-5015-01

Golden Eye

ROM	Chip Size	Program Part №	USA Ver. I ✓Sum	Bd. Loc.	Raw Part №
CPU / Sound Board: 520-5136-00 (Stereo)					
Game ROM	(1M)	965-0214-42	A4.04 I $3FFF	U210	960-5009-00
Voice 1	(4M)	965-0215-42		U17	n/a (masked)
Voice 2	(4M)	965-0216-42		U21	n/a (masked)
Sound	(512K)	965-0217-42		U7	960-7001-02
Display Controller Bd.: 520-5055-01					
Display	(4M)	965-0218-42	A4.00 I $E6ED	ROM 0	960-5015-01

Twister

ROM	Chip Size	Program Part №	USA Ver. I ✓Sum	Bd. Loc.	Raw Part №
CPU / Sound Board: 520-5136-10 (Mono)					
Game ROM	(1M)	965-0219-41	A4.05 I $E9FF	U210	960-5009-00
Voice 1	(4M)	965-0220-41		U17	960-5015-01
Voice 2	(4M)	965-0223-41		U21	960-5015-01
Sound	(512K)	965-0221-41		U7	960-7001-02
Display Controller Bd.: 520-5055-01					
Display	(4M)	965-0222-41	A4.01 I $FD01	ROM 0	960-5015-01

ID4: Independence Day

ROM	Chip Size	Program Part №	USA Ver. I ✓Sum	Bd. Loc.	Raw Part №
CPU / Sound Board: 520-5136-10 (Mono)					
Game ROM	(1M)	965-0224-45	A2.02 I $9CFF	U210	960-5009-00
Voice 1	(4M)	965-0225-45		U17	960-5015-01
Voice 2	(4M)	965-0226-45		U21	960-5015-01
Sound	(512K)	965-0227-45		U7	960-7001-02
Display Controller Bd.: 520-5055-01					
Display	(4M)	965-0228-45	A2.00 I $ABF7	ROM 0	960-5015-01

Space Jam

ROM	Chip Size	Program Part №	USA Ver. I ✓Sum	Bd. Loc.	Raw Part №
CPU / Sound Board: 520-5136-10 (Mono)					
Game ROM	(1M)	965-0229-43	A3.00 I $E6FF	U210	960-5009-00
Voice 1	(4M)	965-0230-43		U17	960-5015-01
Voice 2	(4M)	965-0231-43		U21	960-5015-01
Voice 3	(4M)	965-0232-43		U36	960-5015-01
Sound	(512K)	965-0233-43		U7	960-7001-02
Display Controller Bd.: 520-5055-01					
Display	(4M)	965-0234-43	A3.00 I $0057	ROM 0	960-5015-01

The Star Wars Trilogy - Special Edition (S.E.)

ROM	Chip Size	Program Part №	USA Ver. I ✓Sum	Bd. Loc.	Raw Part №
CPU / Sound Board: 520-5136-10 (Mono)					
Game ROM	(1M)	965-0235-56	A4.03 I $5EFF	U210	960-5009-00
Voice 1	(4M)	965-0236-56		U17	960-5015-01
Voice 2	(4M)	965-0237-56		U21	960-5015-01
Sound	(512K)	965-0238-56		U7	960-7001-02
Display Controller Bd.: 520-5055-01					
Display	(4M)	965-0239-56	A4.00 I $8817	ROM 0	960-5015-01

The Lost World: Jurassic Park

ROM	Chip Size	Program Part №	USA Ver. I ✓Sum	Bd. Loc.	Raw Part №
CPU / Sound Board: 520-5136-10 (Mono)					
Game ROM	(1M)	965-0240-53	A2.01 I $C2FF	U210	960-5009-00
Voice 1	(4M)	965-0241-53		U17	960-5015-01
Voice 2	(4M)	965-0242-53		U21	960-5015-01
Sound	(512K)	965-0243-53		U7	960-7001-02
Display Controller Bd.: 520-5055-01					
Display	(4M)	965-0244-53	A2.01 I $7F46	ROM 0	960-5015-01

The X-Files

ROM	Chip Size	Program Part №	USA Ver. I ✓Sum	Bd. Loc.	Raw Part №
CPU / Sound Board: 520-5136-10 (Mono)					
Game ROM	(1M)	965-0245-46	A3.03 I $A2FF	U210	960-5009-00
Voice 1	(4M)	965-0246-46		U17	960-5015-01
Voice 2	(4M)	965-0247-46		U21	960-5015-01
Sound	(512K)	965-0248-46		U7	960-7001-02
Display Controller Bd.: 520-5055-01					
Display	(4M)	965-0249-46	A3.00 I $66D0	ROM 0	960-5015-01

Starship Troopers

ROM	Chip Size	Program Part №	USA Ver. I ✓Sum	Bd. Loc.	Raw Part №
CPU / Sound Board: 520-5136-15 (Mono FCC NOV97)					
Game ROM	(1M)	965-0250-59	A2.00 I $85FF	U210	960-5009-00
Voice 1	(4M)	965-0251-59		U17	960-5015-01
Voice 2	(4M)	965-0252-59		U21	960-5015-01
Voice 3	(4M)	965-0255-59		U36	960-5015-01
Sound	(512K)	965-0253-59		U7	960-7001-02
Display Controller Bd.: 520-5055-02 (FCC NOV97)					
Display	(4M)	965-0254-59	A2.00 I $E77B	ROM 0	960-5015-01

Viper Night Drivin'

ROM	Chip Size	Program Part №	USA Ver. I ✓Sum	Bd. Loc.	Raw Part №
CPU / Sound Board: 520-5136-16 (Mono FCC FEB98)					
Game ROM	(1M)	965-0266-35	A2.01 I $C5FF	U210	960-5009-00
Voice 1	(4M)	965-0267-35		U17	960-5015-01
Voice 2	(4M)	965-0268-35		U21	960-5015-01
Voice 3	(4M)	965-0269-35		U36	960-5015-01
Voice 4	(4M)	965-0270-35		U37	960-5015-01
Sound	(512K)	965-0271-35		U7	960-7001-02
Display Controller Bd.: 520-5055-03 (FCC FEB98)					
Display	(4M)	965-0272-35	A2.01 I $C17D	ROM 0	960-5015-01

Lost In Space

ROM	Chip Size	Program Part №	USA Ver. I ✓Sum	Bd. Loc.	Raw Part №
CPU / Sound Board: 520-5136-16 (Mono FCC FEB98)					
Game ROM	(1M)	965-0282-60	A1.01 I $B2FF	U210	960-5009-00
Voice 1	(4M)	965-0283-60		U17	960-5015-01
Voice 2	(4M)	965-0284-60		U21	960-5015-01
Voice 3	(4M)	965-0285-60		U36	960-5015-01
Voice 4	(4M)	965-0286-60		U37	960-5015-01
Sound	(512K)	965-0287-60		U7	960-7001-02
Display Controller Bd.: 520-5055-03 (FCC FEB98)					
Display	(4M)	965-0288-60	A1.02 I $32AB	ROM 0	960-5015-01

Godzilla

ROM	Chip Size	Program Part №	USA Ver. I ✓Sum	Bd. Loc.	Raw Part №
CPU / Sound Board: 520-5136-16 (Mono FCC FEB98)					
Game ROM	(1M)	965-0289-40	A2.05I $B1FF	U210	960-5009-00
Voice 1	(4M)	965-0290-40		U17	960-5015-01
Voice 2	(4M)	965-0291-40		U21	960-5015-01
Voice 3	(4M)	965-0292-40		U36	960-5015-01
Voice 4	(4M)	965-0293-40		U37	960-5015-01
Sound	(512K)	965-0294-40		U7	960-7001-02
Display Controller Bd.: 520-5055-03 (FCC FEB98)					
Display	(4M)	965-0295-40	A2.00 I $C929	ROM 0	960-5015-01

South Park

ROM	Chip Size	Program Part №	USA Ver. I ✓Sum	Bd. Loc.	Raw Part №
CPU / Sound Board: 520-5136-16 (Mono FCC FEB98)					
Note: This game uses four (4) 8MB VOICE ROMS at U17, U21, U36 & U37 requiring a Jumper at Loc. W6. Refer to CPU/Snd. Bd. Schematic (2 of 3).					
Game ROM	(1M)	965-0301-71	A I $	U210	960-5009-00
Voice 1	(8M)	965-0302-71		U17	960-5016-00
Voice 2	(8M)	965-0303-71	**GAME CODE**	U21	960-5016-00
Voice 3	(8M)	965-0304-71	**IN**	U36	960-5016-00
Voice 4	(8M)	965-0305-71	**PRODUCTION**	U37	960-5016-00
Sound	(512K)	965-0306-71		U7	960-7001-02
Display Controller Bd.: 520-5055-03 (FCC FEB98)					
Display	(4M)	965-0307-71	A I $	ROM 0	960-5015-01

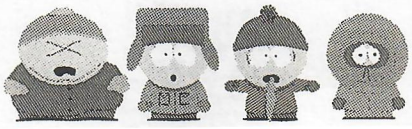
Game Revisions can be updated after the Production Run. This Table is accurate as of the printing of this manual. If any changes occurred, the next game manual will include the updated information. The version stated is USA. If there is a question of as to the latest Code Revision & Check Sum call our Technical Support Department.

APPENDIX B
Semi-Conductors / Integrated Circuits / Relays Cross-Reference Table

Table №	Type	Source Number	SEGA PINBALL™	N T E®	E C G®	Radio Shack®	R C A®
	RECTIFICATION, BLOCKING AND/OR DAMPENING DIODES						
1	Diode	1N4001	112-5001-00	NTE552	ECG552	- — - — -	SK9000
	Diode	1N4004	112-5003-00	NTE116	ECG116	276-1103	SK3312
	Diode	1N5401	112-0056-00	NTE5801	ECG5801	276-1143	SK9004
	Diode	1N5404	112-5004-00	NTE5804	ECG5804	276-1144	SK9007
	Diode	T6A10L	112-5006-01	- — - — -	- — - — -	- — - — -	- — - — -
	Diode	FR302	112-5009-00	- — - — -	ECG588	- — - — -	SK5014
	ZENER DIODES						
2	Diode	1N4742A 12v	112-0061-00	NTE142A	ECG142A	276-563	SK12V
	Diode	1N4760B 68v	112-0062-00B	NTE5092A	ECG5092A	- — - — -	SK68V
	Diode	1N4764A 100v	112-0049-00A	NTE5096A	ECG5096A	- — - — -	SK100V
	Diode	1N5228 3.9v	112-0053-00	NTE5007A	ECG5007A	- — - — -	SK3A9
	Diode	1N5234B 6.2v	112-0047-00B	NTE5013A	ECG5013A	276-561	SK6A2
	Diode	1N5379 110v	112-0072-00	NTE5157	ECG5157	- — - — -	SK110X
	Diode	1N6267A 6.8v	112-5011-00	- — - — -	ECG4902	- — - — -	- — - — -
	Diode	1N4752A 33v	112-5010-00A	- — - — -	- — - — -	- — - — -	SK33V
	Diode	1N4736 6.8v 1w	112-5007-00	- — - — -	- — - — -	- — - — -	- — - — -
	TRANSISTORS - TYPE FET, NPN, PNP AND/OR SCR						
3	FET Trans.	STP20N10L	110-0106-00	- — - — -	ECG2943	- — - — -	- — - — -
	FET Trans.	STP19N06L	110-0088-00	- — - — -	- — - — -	- — - — -	- — - — -
	FET Trans.	VN02	110-0089-00	- — - — -	- — - — -	- — - — -	- — - — -
	NPN Trans.	2N4401	- — - — -	NTE85	ECG85	276-2009	SK3124A
	NPN Trans.	2N6427	110-0070-00	NTE48	ECG48	- — - — -	SK4906
	NPN Trans.	MJE340	110-0071-00	NTE157	ECG157	- — - — -	SK3747
	NPN Trans.	MPSA42	110-0082-00	NTE287	ECG287	- — - — -	SK3232
	NPN Trans.	2N3904	110-0069-00	NTE123AP	ECG123AP	276-2009	- — - — -
	NPN Trans.	TIP122	110-0067-00	NTE261	ECG261	276-2068	SK3896
	NPN Trans.	MJE15030	110-0101-00	NTE375	ECG375	- — - — -	SK9118
	PNP Trans.	2N5401	110-0078-00	NTE288	ECG288	- — - — -	SK3434
	PNP Trans.	MJE15031	110-0103-00	NTE292	ECG292	- — - — -	SK3441
	PNP Trans.	MJE350	110-0072-00	NTE374	ECG374	- — - — -	SK9042
	PNP Trans.	MPSA92	110-0100-00	NTE288	ECG278	- — - — -	SK3434
	PNP Trans.	TIP42	110-0068-00	NTE332	ECG332	- — - — -	SK9236
	PNP Trans.	TIP32C	110-0081-00	NTE292	ECG292	- — - — -	SK3441
	PNP Trans.	TIP36C	110-0077-00	NTE393	ECG393	- — - — -	SK3961
	SCR Trans.	2N5060	110-0074-00	NTE5400	ECG5400	276-1067	SK3950
	SCR Trans.	SCR2800B	110-0083-00	- — - — -	ECG5463 / 65 / 66 / 68		- — - — -

	BRIDGE RECTIFIERS (BR)			Comments:
4	BR (Present)	DB or CM3501	124-5000-00	For WhiteStar I/O Bds., BR = 35 Amp @ 100v P.I.V.
	BR (Old)	MDA2501	124-2501-00	BR = 25 Amp @ 100v P.I.V.
	BR (Old)	MDA3502	124-3502-00	BR = 35 Amp @ 200v P.I.V.

	RELAYS			Comments:
5	Relay	FRL-264 D024/02CK	190-5002-00	For PPB, Power Supply, & White Star I/O Boards, Relay = 24v DC 10 Amp DPDT
	Relay	FRL-264 D006/04CV	190-5001-00	For CPU Boards, Relay = 6v DC 5 Amp 4 Pole DT



APPENDIX C
Game Mfg. Date, Manual Part Nº and CPU Jumper Table (1-28 only)

Game Name	Game Mfg. Date and Manual PNº	CPU Ver.	EPROM Position	Jumpers Installed	Jumpers Removed
1. Laser War	MAY 87 780-5001-00	1 2	5C 5B, 5C	J4 J6a J7a J4 J5a J6a	J5 J6 J7b J5 J5b J6b
2. Secret Service	MAR 88 780-5002-00	2	5B, 5C	J4	J5
3. Torpedo Alley	AUG 88 780-5003-00	2	5B, 5C	J4	J5
4. Time Machine	DEC 88 780-5004-00	2	5B, 5C	J4	J5
5. Playboy 35th Anniversary	MAY 89 780-5005-00	2	5B, 5C	J4	J5
6. ABC Monday Night Football	SEP 89 780-5007-00	2	5B, 5C	J4	J5
7. Robocop	NOV 89 780-5006-00	2	5B, 5C	J4	J5
8. Phantom of the Opera	JAN 90 780-5008-00	2	5B, 5C	J4	J5
9. Back to the Future	JUN 90 780-5009-00	3	5B, 5C	J4	J5
10. The Simpsons	SEP 90 780-5012-00	3	5B, 5C	J4	J5
11. Checkpoint	FEB 91 780-5010-00	3	5B, 5C	J4	J5
12. Teenage Mutant Ninja Turtles	MAY 91 780-5017-00	3	5B, 5C	J4	J5
13. Batman	JUL 91 780-5011-00	3	5B, 5C	J4	J5
14. Star Trek 25th Anniversary	OCT 91 780-5014-00	3	5C	J5	J4
15. Hook	JAN 92 780-5019-00	3	5C	J5	J4
16. Lethal Weapon 3	JUN 92 780-5026-00	3	5C	J5	J4
17. Star Wars	OCT 92 780-5024-00	3	5C	J5	J4
18. Rocky & Bullwinkle & Friends	FEB 93 780-5022-00	3	5C	J5	J4
19. Jurassic Park	APR 93 780-5020-00	3	5C	J5	J4
20. Last Action Hero	AUG 93 780-5027-00	3	5C	J5	J4
21. Tales from the Crypt	NOV 93 780-5018-00	3	5C	J5	J4
22. The Who's Tommy	FEB 94 780-5028-00	3	5C	J5	J4
23. WWF Royal Rumble	MAY 94 780-5023-00	3	5C	J5	J4
24. Guns N' Roses	JUL 94 780-5029-00	3	5C	J5	J4
25. Maverick	SEP 94 780-5031-00	3	5C	J5	J4
26. Mary Shelley's Frankenstein	DEC 94 780-5036-00	3	5C	J5	J4
27. Baywatch	MAR 95 780-5033-00	3	5C	J5	J4
28. Batman Forever	JUL 95 780-5038-00	3	5C	J5	J4

Game Name	Game Mfg. Date and Manual PNº	CPU Ver.	EPROM Position	Jumpers Installed	Jumpers Removed
29. Apollo 13	NOV 95 780-5044-00	—	U210	n / a	n / a
30. Golden Eye	FEB 96 780-5042-00	—	U210	n / a	n / a
31. Twister	APR 96 780-5041-00	—	U210	n / a	n / a
32. ID4: Independence Day	JUL 96 780-5045-00	—	U210	n / a	n / a
33. Space Jam	OCT 96 780-5043-00	—	U210	n / a	n / a
34. The Star Wars Trilogy - S.E.	FEB 97 780-5056-00	—	U210	n / a	n / a
35. The Lost World: J.P.	JUN 97 780-5053-00	—	U210	n / a	n / a
36. The X-Files	AUG 97 780-5046-00	—	U210	n / a	n / a
37. Starship Troopers	NOV 97 780-5059-00	—	U210	n / a	n / a
38. Viper Night Drivin'	FEB 98 780-5035-00	—	U210	n / a	n / a
39. Lost In Space	JUN 98 780-5060-00	—	U210	n / a	n / a
40. Godzilla	SEP 98 780-5040-00	—	U210	n / a	n / a
41. South Park	JAN 99 780-5071-00	—	U17 U21 U36 U37	W6 CPU/Snd.	n / a

† Additional Information for Installed / Removed Jumpers (List 1-28 only):

Board Combinations with **ROM** at Location **5C** (Game 1, Ver1) **Installed** J1b, J3, J4, J6a, **J7a** & J8 **Removed** J1a, J2, J5, **J6** & **J7b**

Board Combinations w/ **ROM** at Locations **5B, 5C** (Game 1, Ver2) **Installed** J1b, J3, J4, **J5a, J6a, J7b** & J8 **Removed** J1a, J2, J5, **J5b, J6b,** & **J7a**

Board Combinations w/ **ROM** at Locations **5B, 5C** (Games 2-12, Ver2/3) **Installed** J1b, J3, **J4, J5b, J6b,** J7b & J8 **Removed** J1a, J2, **J5, J5a, J6a** & J7a

Board Combinations with **ROM** at Locations **5C** (Games 14+, Ver3) **Installed** J1b, J3, **J5,** J5b, J6b, J7b & J8 **Removed** J1a, J2, **J4,** J5a, J6a & J7a

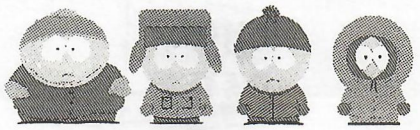
* Version 1 has a 2K RAM which is a 24-pin IC in Position 5D; Versions 2 & 3 have a 8K RAM which is a 28-PIN IC in Position 5D.

APPENDIX D
Board Type Table

Game Name	Flipper	Sound	Power Supply	Display X-Digit
Laser War	2-Flipper Board Not Required	***Initial:*** 520-5002-00 ***replaced with:*** 520-5002-02 520-5002-01 was not used.	520-5000-00	Master: 520-5004-00 plus: 7 Digit Alpha/Numeric 520-5005-00 (Qty. 2) 7 Digit Numeric 520-5006-00 (Qty. 2) 4 Digit Numeric 520-5007-00
Secret Service	3-Flipper Board Not Required	520-5002-02	520-5000-00	520-5014-01 7 Digit Alpha/Numeric Combined
Torpedo Alley	3-Flipper Board Not Required	520-5002-02	520-5000-00	520-5014-01 7 Digit Alpha/Numeric Combined
Time Machine	2-Flipper Board Not Required	520-5002-02	520-5000-00	520-5014-01 7 Digit Alpha/Numeric Combined
Playboy 35th Anniversary	520-5033-00 2-Flip. (for 100 games)	520-5002-02	520-5000-00	520-5014-01 7 Digit Alpha/Numeric Combined
ABC Monday Night Football	520-5033-00 2-Flip. (for 100 games)	520-5002-02	520-5000-00	520-5030-00 16 Digit Alpha/Numeric Combined
Robocop	520-5033-00 2-Flipper	520-5002-02	520-5000-00	520-5030-00 16 Digit Alpha/Numeric Combined
Phantom of the Opera	520-5033-00 2-Flipper	520-5002-02	520-5000-00	520-5030-00 16 Digit Alpha/Numeric Combined
Back to the Future	520-5033-00 2-Flipper	520-5002-02	520-5000-00	520-5030-00 16 Digit Alpha/Numeric Combined
The Simpsons	520-5033-00 2-Flipper	520-5002-03	520-5000-00	520-5030-00 16 Digit Alpha/Numeric Combined

Game Name	Flipper	Sound	Power Supply	Dot Matrix Display	Display Controller	OPTO TRANS./REC.	OPTO APPLICATION
Checkpoint	520-5033-00 2-Flipper	520-5002-03	520-5047-00	520-5042-00 128 X 16	Not Used w/ 128 X 16	None Used	None Used
Teenage Mutant Ninja Turtles	520-5033-00 2-Flipper	520-5002-03	520-5047-00	520-5042-00 128 X 16	Not Used w/ 128 X 16	None Used	None Used
Batman	520-5033-00 2-Flipper	520-5050-01	520-5047-00	520-5042-00 128 X 16	Not Used w/ 128 X 16	None Used	None Used
Star Trek 25th Anniversary	520-5033-00 2-Flipper	520-5050-01	520-5047-00	520-5042-00 128 X 16	Not Used w/ 128 X 16	None Used	None Used
Hook	520-5033-00 2-Flipper	520-5050-01	520-5047-00	520-5042-00 128 X 16	Not Used w/ 128 X 16	None Used	None Used
Lethal Weapon 3	520-5033-00 2-Flipper	520-5050-01	520-5047-01	520-5052-00 128 X 32	520-5055-00	None Used	None Used
Star Wars	520-5033-00 2-Flipper	520-5050-02	520-5047-01	520-5052-00 128 X 32	520-5055-00	None Used	None Used
Rocky & Bullwinkle & Friends	520-5033-00 2-Flipper	520-5050-02	520-5047-01	520-5052-00 128 X 32	520-5055-00	None Used	None Used
Jurassic Park	520-5076-00 3-Flipper	520-5050-02	520-5047-02	520-5052-00 128 X 32	520-5055-00	None Used	None Used
Last Action Hero	520-5070-00 2-Flipper	520-5050-03	520-5047-02	520-5052-00 128 X 32	520-5055-00	None Used	None Used
Tales from the Crypt	520-5076-00 3-Flipper	520-5050-03	520-5047-02	520-5052-00 128 X 32	520-5055-01	None Used	None Used
The Who's Tommy	520-5076-00 3-Flipper	520-5077-00	520-5047-02	520-5052-00 128 X 32	520-5055-01	None Used	None Used
WWF Royal Rumble	**520-5070 / 5080 -00 4-Flipper (2X2)**	520-5077-00	520-5047-02	520-5052-00 128 X 32	520-5055-01	None Used	None Used
Guns N' Roses	520-5076-00 3-Flipper	520-5077-00	520-5047-02	520-5052-00 128 X 32	520-5055-01	None Used	None Used
Maverick	520-5076-00 3-Flipper	520-5050-03	520-5047-03	520-5075-00 192 X 64	520-5092-01	520-5102-00 520-5103-00	Single OPTO: Paddle Boat
Mary Shelley's Frankenstein	520-5076-00 3-Flipper	520-5077-00	520-5047-03	520-5075-00 192 X 64	520-5092-01	None Used	None Used
Baywatch	**520-5070 / 5080 -00 4-Flipper (2X2)**	520-5126-02	520-5047-03	520-5075-00 192 X 64	520-5092-01	520-5124-00 520-5125-00	Single OPTO: Ball Trough
Batman Forever	520-5076-00 3-Flipper	520-5126-02	520-5047-03	520-5075-00 192 X 64	520-5092-01	520-5124-00 520-5125-00	Single OPTO: Ball Trough

Table continued on the next page.



APPENDIX D
Board Type Table

GAMES HEREON USE THE WHITE STAR BOARD SYSTEM™ (WITH THE ADDITION OF THE I/O POWER DRIVER BOARD):

Game Name	Flipper	I/O Power Driver	CPU/Sound Stereo	Disp. Power Supply	Dot Matrix Display	Display Controller	OPTO TRANS./REC.	OPTO APPLICATION
Apollo 13	520-5080-00 2-Flipper	520-5137-00	520-5136-00	520-5138-00	520-5052-00 128 X 32	520-5055-01	520-5124-00 / 520-5125-00	Single OPTO: Ball Trough
Golden Eye	520-5080-00 2-Flipper	520-5137-00	520-5136-00	520-5138-00	520-5052-00 128 X 32	520-5055-01	520-5124-00 / 520-5125-00	Single OPTO: Ball Trough

GAMES HEREON USE THE WHITE STAR BOARD SYSTEM™ (WITH THE DELETION OF THE FLIPPER BOARD):

Game Name	I/O Power Driver	CPU/Sound Mono	Disp. Power Supply	Dot Matrix Display	Display Controller	OPTO TRANS./REC.	OPTO APPLICATION
Twister	520-5137-01	520-5136-10	520-5138-00	520-5052-00 128 X 32	520-5055-01	520-5124-00 / 520-5125-00	Single OPTO: Ball Trough
ID4: Independence Day	520-5137-01	520-5136-10	520-5138-00	520-5052-00 128 X 32	520-5055-01	520-5124-00 / 520-5125-00	Single OPTO: Ball Trough
						520-5082-00 / 520-5083-00	Long Hop OPTO: Alien Head
Space Jam	520-5137-01	520-5136-10	520-5138-00	520-5052-00 128 X 32	520-5055-01	520-5124-00 / 520-5125-00	Single OPTO: Ball Trough
The Star Wars Trilolgy - S.E.	520-5137-01	520-5136-10	520-5138-00	520-5052-00 128 X 32	520-5055-01	520-5124-00 / 520-5125-00	Single OPTO: Ball Trough
The Lost World: J.P.	520-5137-01	520-5136-10	520-5138-00	520-5052-00 128 X 32	520-5055-01	520-5124-00 / 520-5125-00	Single OPTO: Ball Trough
						520-5162-00 (combo)	Slotted OPTO: Snagger Motor
The X-Files	520-5137-01	520-5136-10	520-5138-00	520-5052-00 128 X 32	520-5055-01	520-5124-00 / 520-5125-00	Single OPTO: Ball Trough
						520-5082-00 / 520-5083-00	Long Hop OPTO: File Cab. Enter
						520-5155-00 (combo)	Slotted OPTO: File Cab. Motor
Starship Troopers	520-5137-01	520-5136-15	520-5138-00	520-5052-00 128 X 32	520-5055-02	520-5124-00 / 520-5125-00	Single OPTO: Ball Trough
						520-5082-00 / 520-5083-01	Long Hop OPTO: L/R Orbit Lane
Viper Night Drivin'	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32	520-5055-03	520-5124-00 / 520-5125-00	Single OPTO: Ball Trough
						520-5082-00 / 520-5083-01	Long Hop OPTO: Jump Ramp
Lost In Space	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32	520-5055-03	520-5173-00 / 520-5174-00	Dual OPTO: Ball Trough
Godzilla	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32	520-5055-03	520-5173-00 / 520-5174-00	Dual OPTO: Ball Trough
South Park	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32	520-5055-03	520-5173-00 / 520-5174-00	Dual OPTO: Ball Trough
						520-5082-00 / 520-5083-01	Long Hop OPTO: Kenny Trough

† ***Note:*** To order Game Specific CPU/Sound Board please specify Game Name.

APPENDIX E
Generic Coil Cross-Reference Guide † ‡

STANDARD COILS						FLIPPER COILS			
GA-TURNS	Res. (Ω)	SPI PART Nº	GA-TURNS	Res. (Ω)	SPI PART Nº	GAUGE-TURNS	Res. (Ω)	COLOR	SPI PART Nº
20-400	1.0 Ω	090-5021-00	24-940 †	5.5 Ω	090-5036-00T	21-900 †	*not available*	RED	090-5020-10T
22-500	1.7 Ω	090-5017-00			090-5036-00B	22-750/30-2600 ‡	2.6 / 92.0 Ω	N/A	090-5011-00
22-600	2.2 Ω	090-5023-00	25-1240	9.3 Ω	090-5034-00	22-900 †	3.4 Ω	YEL	090-5020-20T
23-700	3.1 Ω	090-5022-00	26-1200 †	10.3 Ω	090-5044-00T	22-1080 †	4.3 Ω	YEL/GRN	090-5032-00T
23-750	3.4 Ω	090-5019-00			090-5044-00B				090-5032-00B
23-800 †	3.6 Ω	090-5001-00T	27-1300	14.2 Ω	090-5003-00	23-620/30-2600 ‡	2.4 / 75.0 Ω	N/A	090-5006-00
		090-5001-00B	27-1400	14.7 Ω	090-5015-00	23-700/30-2600 ‡	3.0 / 83.5 Ω	N/A	090-5013-00
23-840	4.0 Ω	090-5005-00	27-1500	16.3 Ω	090-5004-00T	23-800/30-2600 ‡	2.8 / 90.5 Ω	N/A	090-5012-00
23-1200	7.1 Ω	090-5008-00			090-5004-00B	23-900	3.8 Ω	GRN	090-5020-30
23½-765	3.6 Ω	090-5037-03	28-1050	11.5 Ω	090-5046-00	23-1100	5.1 Ω	ORG	090-5030-00
24-900	5.0 Ω	090-5002-00	29-2000	33.6 Ω	090-5016-00	24-1570	9.5 Ω	N/A	090-5025-00
						25-1800	13.8 Ω	BLU/GRN	090-5041-00

NOTE: Ohm values may vary +/- .03Ω depending on meter calibration.

† Coil Part Nºs ending with a "T" signifies the Diode is on the top of the lug; ...ending with a "B" signifies the Diode is on the bottom of the lug.
‡ These coils are dual-wound.

MAGNET COILS		
GA-TURNS	Res. (Ω)	SPI PART Nº
22-650	4.3 Ω	090-5042-01

The above coil has 12" leads.

LUGLESS COILS		
GA-TURNS	Res. (Ω)	SPI PART Nº
23-800	3.6 Ω	090-5053-00

MINI-COILS		
GA-TURNS	Res. (Ω)	SPI PART Nº
29-1000	15.2 Ω	090-5059-00
31-1500	52.0 Ω	090-5054-00
32-1800	50.2 Ω	090-5031-00

NOTE: All Coil Part Nºs listed ***Do Not Include*** Coil Sleeves (must be ordered separately)

Flipper Coil Table ‡ ††

GAME NAME	Nº of Flip-pers	LOWER FLIPPERS SPI Nº / Gauge-Turns / Color		UPPER FLIPPERS SPI Nº / Gauge-Turns / Color	
		LEFT	RIGHT	LEFT	RIGHT
Laser War ‡	2	090-5011-00 **22-750 / 30-2600**	SAME	Not Used	Not Used
Secret Service ‡	3	090-5006-00 **23-620 / 30-2600**	SAME	Not Used	090-5006-00 **23-620 / 30-2600**
Torpedo Alley ‡	3	090-5011-00 **22-750 / 30-2600**	090-5013-00 **23-700 / 30-2600**	Not Used	090-5012-00 **23-800 / 30-2600**
Time Machine ‡	2	090-5011-00 **22-750 / 30-2600**	SAME	Not Used	Not Used

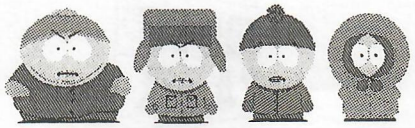
‡ These coils are dual-wound.

Playboy 35th Anniversary ††	2	090-5020-02 **22-900 -YEL-**	SAME	Not Used	Not Used
ABC Monday Night Football ††	2	090-5020-02 **22-900 -YEL-**	SAME	Not Used	Not Used

†† A very small % of these games used a 090-5020-20 coil which used a proto-type Solid State Flipper System. The two types of coils both are 22-900 coils; the only difference being the addition of the 1N5404 Diode on the (-02) coils which was used in the Deger Design.

Robocop	2	090-5020-20 **22-900 -YEL-**	SAME	Not Used	Not Used
Phantom of the Opera	2	090-5020-20 **22-900 -YEL-**	SAME	Not Used	Not Used
Back to the Future	2	090-5020-20 **22-900 -YEL-**	SAME	Not Used	Not Used
The Simpsons	2	090-5020-20 **22-900 -YEL-**	SAME	Not Used	Not Used
Checkpoint	2	090-5020-20 **22-900 -YEL-**	SAME	Not Used	Not Used
Teenage Mutant Ninja Turtles	2	090-5020-30 **23-900 -GRN-**	SAME	Not Used	Not Used
Batman	2	090-5020-30 **23-900 -GRN-**	SAME	Not Used	Not Used
Star Trek 25th Anniversary	2	090-5020-30 **23-900 -GRN-**	SAME	Not Used	Not Used
Hook	2	090-5030-00 **23-1100 -ORG-**	090-5020-30 **23-900 -GRN-**	Not Used	Not Used
Lethal Weapon 3	2	090-5030-00 **23-1100 -ORG-**	SAME	Not Used	Not Used

Table continued on the next page.



APPENDIX E
Flipper Coil Table †

GAME NAME	Nº of Flip-pers	LOWER FLIPPERS		UPPER FLIPPERS	
		SPI Nº / Gauge-Turns / Color		SPI Nº / Gauge-Turns / Color	
		LEFT	RIGHT	LEFT	RIGHT
Star Wars	2	090-5032-00 **22-1080 -YEL-GRN-**	SAME	Not Used	Not Used
Rocky & Bullwinkle & Friends	2	090-5020-30 **23-900 -GRN-**	SAME	Not Used	Not Used
Jurassic Park	3	090-5020-30 **23-900 -GRN-**	SAME	Not Used	090-5030-00 **23-1100 -ORG-**
Last Action Hero	2	090-5020-30 **23-900 -GRN-**	SAME	Not Used	Not Used
Tales from the Crypt	3	090-5032-00 **22-1080 -YEL-GRN-**	SAME	Not Used	090-5041-00 **25-1800 -BLU-GRN-**
The Who's Tommy	3	090-5020-30 **23-900 -GRN-**	SAME	090-5041-00 **25-1800 -BLU-GRN-**	Not Used
WWF Royal Rumble	4	090-5032-00 **22-1080 -YEL-GRN-**	SAME	090-5041-00 **25-1800 -BLU-GRN-**	SAME
Guns N' Roses	3	090-5032-00 **22-1080 -YEL-GRN-**	SAME	090-5030-00 **23-1100 -ORG-**	Not Used
Maverick	3	090-5032-00 **22-1080 -YEL-GRN-**	SAME	Not Used	090-5032-00 **22-1080 -YEL-GRN-**
Mary Shelley's Frankenstein	3	090-5030-00 **23-1100 -ORG-**	SAME	Not Used	090-5030-00 **23-1100 -ORG-**
Baywatch	4	090-5030-00 **23-1100 -ORG-**	090-5020-30 **23-900 -GRN-**	090-5025-00 **24-1570 -N/A-**	090-5030-00 **23-1100 -ORG-**
Batman Forever	3	090-5032-00 **22-1080 -YEL-GRN-**	090-5020-20 **22-900 -YEL-**	Not Used	090-5020-30 **23-900 -GRN-**
Apollo 13	2	090-5032-00 **22-1080 -YEL-GRN-**	SAME	Not Used	Not Used
Golden Eye	2	090-5032-00 **22-1080 -YEL-GRN-**	SAME	Not Used	Not Used
Twister	2	090-5020-20 **22-900 -YEL-**	090-5032-00 **22-1080 -YEL-GRN-**	Not Used	Not Used
ID4: Independence Day	3	090-5032-00 **22-1080 -YEL-GRN-**	SAME	Not Used	090-5020-30 **23-900 -GRN-**
Space Jam †	2	090-5032-00T **22-1080 -YEL-GRN-**	090-5020-20T **22-900 -YEL-**	Not Used	Not Used
The Star Wars Trilogy - Special Edition †	2	090-5032-00T **22-1080 -YEL-GRN-**	SAME	Not Used	Not Used
The Lost World: Jurassic Park †	2	090-5032-00T **22-1080 -YEL-GRN-**	SAME	Not Used	Not Used
The X-Files †	2	090-5032-00T **22-1080 -YEL-GRN-**	SAME	Not Used	Not Used
Starship Troopers †	3	090-5030-00T **23-1100 -ORG-**	SAME	Not Used	090-5032-00T **22-1080 -YEL-GRN-**
Viper Night Drivin' †	2	090-5030-00T **23-1100 -ORG-**	SAME	Not Used	Not Used
Lost In Space †	2	090-5030-00T **23-1100 -ORG-**	090-5032-00T **22-1080 -YEL-GRN-**	Not Used	Not Used
Godzilla †	2	090-5032-00T **22-1080 -YEL-GRN-**	SAME	Not Used	Not Used
South Park †	2	090-5030-00T **23-1100 -ORG-**	SAME	Not Used	Not Used

† Coil Part Nºs ending with a "T" signifies the Diode is on the top of the lug (on the coil-winding side);
Coil Part Nºs ending with a "B" signifies the Diode is on the bottom of the lugs.

APPENDIX F
Motor Specification Table

The following table only list games that used motors.

Game Name	Function	Specifications	Part Nº
ABC Monday Night Football	Goal Post Up/Down Movement	Motor 24v A.C. 60 RPM CW	515-5222-00
Phantom of the Opera	Organ Up/Down Movement	Bowman Motor 24v 60Hz 3W 11 RPM CCW	515-5256-00
Checkpoint	Mag Wheel (in Backbox)	Motor D.C. (KEN)	041-5005-00
	Shaker	Johnson Motor (Vibrator)	041-5002-00
Teenage Mutant Ninja Turtles	Spinning Pizza Ball Deflector	Gear Motor 24v A.C. 325 RPM CW	515-5397-00
Batman	Bar Target Up/Down Movement	Bowman Motor 24v 60Hz 3W 11 RPM CCW	515-5256-00
Star Trek 25th Anniversary	Swinging Target	Bowman Motor 24v 22½ RPM	515-5534-00
	Transporter F/X	Gear Motor 24v A.C. 3½ RPM	500-5421-00
	Cooling Fan (for Transporter F/X)	4½" Motor 12v	041-5014-00
Lethal Weapon 3	Spinning Light	Motor 2½ v A.C. 4000 RPM CCW	041-5017-00
Star Wars	Bar Target Up/Down Movement	Bowman Motor 24v 60hz 3W 11 RPM CCW	515-5256-00
	R2D2 Robot Left/Right Movement	Bowman Motor 24v A.C. 22½ RPM CW	515-5571-00
	Death Star Rotation	Bowman "G" Motor 24v A.C. 60Hz 6 RPM CW	515-5570-00
Rocky & Bullwinkle & Friends	Nell Log "Cutting Blade" Forward/Back Movement	Autotrol Model E Motor 24v 60hz 4W 3 RPM CCW	041-5023-00
Jurassic Park	T-Rex Left/Right Movement	Multi Motor 5v D.C.	041-5025-00
	T-Rex Up/Down Movement	Bowman Motor 24v 11 RPM CW	041-5026-00
	Shaker	Johnson Motor (Vibrator)	041-5002-00
Last Action Hero	Crane Left/Right Movement	Multi Products Motor 12v D.C. #3312 OSC	041-5027-00
	Shaker	Johnson Motor (Vibrator) 10.5v D.C. 10 AMP 2950 RPM CW	041-5029-00
Tales from the Crypt	Tombstone Up/Down Movement	Bowman Motor 24v A.C. 6 RPM CCW	515-5900-00
	Shaker	Johnson Motor (Vibrator) 10.5v D.C. 10 AMP 2950 RPM CW	041-5029-00
The Who's Tommy	Mirror Up/Down Movement	Bowman Motor 24v A.C. 6 RPM CCW	515-5900-00
	Flipper Blinders	Servo Motor (94102)	041-5032-00
	Spinning Airplane Propellers	Motor D.C.	041-5033-00
WWF Royal Rumble	Shaker	Johnson Motor (Vibrator) 10.5v D.C. 10 AMP 2950 RPM CW	041-5029-00
Maverick, The Movie	Turning Paddle Wheel	Motor 24v A.C. 10 RPM	041-5036-00
Mary Shelley's Frankenstein	Creature Head Left/Right Movement	Servo Motor (94102)	041-5032-00
Batman Forever	Cannon Left/Right Movement	Bowman Motor 24v A.C. 60Hz 3W 6 RPM CCW	515-6383-00
Apollo 13	Rocket Up/Down Movement	Bowman Motor 24v A.C. 60Hz 3W 6 RPM CCW	515-6383-00
	Moon Unit Rotational Orbit	Multi Products Motor 24v A.C. 50/60Hz 3W 6 RPM CCW	515-6487-00
	Shaker	Johnson Motor (Vibrator) 10.5v D.C. 10 AMP 2950 RPM CW	041-5029-00
Golden Eye	Satellite Left/Right Movement	Bowman Motor 24v A.C. 60Hz 3W 6 RPM CW	515-6528-00

Table continued on the next page.

APPENDIX F
Motor Specification Table

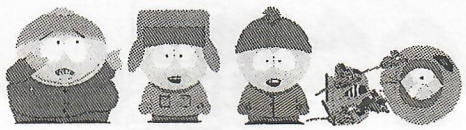
The following table only list games that used motors.

Game Name	Function	Specifications	Part №
Twister	Spinning Disc with Magnet	Multi Products Motor 24v A.C. 50/60Hz 3W 325 RPM CCW	515-6347-00
	Backbox Fan (Tornado Wind)	Multi Products Motor 24v A.C. 50/60Hz 3W 3600 RPM CW	515-6531-00
ID4: Independence Day	Alien Head Open/Close Movement	Servo Motor (94322)	041-5045-00
The Star Wars Trilogy - S.E.	X-Wing Left/Right Movement	Bowman Motor 24v A.C. 60Hz 3W 10 RPM CCW	515-6383-01
The Lost World: J.P.	Snagger & Center Link Lift Up/Down Movement	Multi Products Motor 20v D.C. 9 RPM Non-Directional	515-6715-03
	Shaker	Johnson Motor (Vibrator) 10.5v D.C. 10 AMP 2950 RPM CW	041-5029-00
The X-Files	X-File Cabinet Lift Up/Down Movement	Multi Products Motor 20v D.C. 9 RPM CCW	041-5057-00
Starship Troopers	Warrior Bug Forward/Reverse Movement	Haydon Switch & Instrument, Inc. Stepper Motor, Series 36000: 1.4"ø (Non-Captive Shaft) HSI #36864-12 (Unipolar) / Travel per Step = .004 Step Angle = 15° / 12v D.C. / 4.6W	515-6794-00-59
Lost In Space	Spinning Disc with Magnet	Multi Products Motor 24v A.C. 50/60Hz 3W 325 RPM CCW	515-6347-00
Godzilla	Shaker	Johnson Motor (Vibrator) 10.5v D.C. 10 AMP 2950 RPM CW ‡	041-5029-**01**
	*‡ Please Note: Not Compatible with old Motor 041-5029-**00** (Shaker Motor Assy. 515-5893-00). THIS NEW MOTOR CAN ONLY BE USED IN NEW SHAKER MOTOR ASSY. 515-5893-**01**.*		

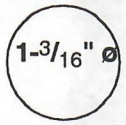
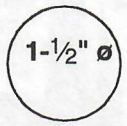
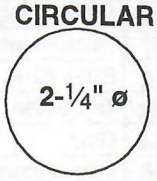
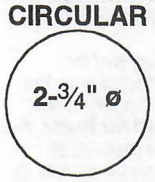
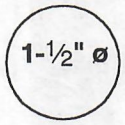
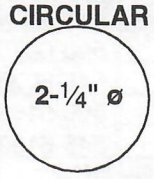
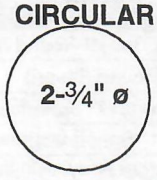
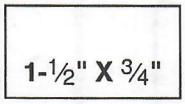
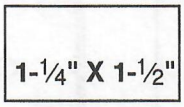
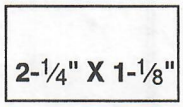
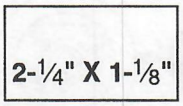
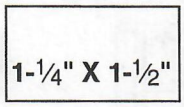
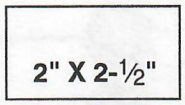
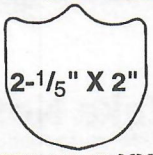
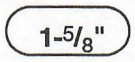
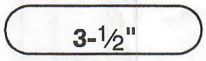
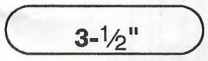
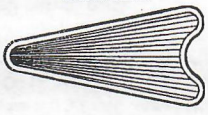
No motors were used on the following games: Laser War, Secret Service, Torpedo Alley, Time Machine, Playboy 35th Anniversary, Robocop, Back to the Future, The Simpsons, Hook, Guns N' Roses, Baywatch, Space Jam, Viper Night Drivin', South Park.

APPENDIX G
Part Number Prefix Classification Codes

I.	**ELECTRICAL SOURCE, ENERGY & SIGNAL CONVERTERS**	
	010-	Transformers
	031-	Speakers
	090-	Solenoids (Coils)
II.	**CONDUCTORS, CONNECTORS & INSULATORS**	
	034-	Line Cords
	036-	Cable and Harness Assemblies
	041-	Motors
	045-	Connectors (All Types)
	077-	Lamp Sockets
III.	**CIRCUITS & CIRCUIT ELEMENTS**	
	100-	ICs
	110-	Transistors
	112-	Diodes
	121-	Resistors
	123-	Resistors (Variable & Adjustable)
	124-	Regulators & Bridge Rectifiers
	125-	CAPS
	140-	Crystals
	165-	Light Bulbs
	180-	Switches
	190-	Relays
IV.	**BOLTS, SCREWS, NUTS & WASHERS**	
	231-	Bolts
	232-	Screws (Pan Head)
	234-	Screws (HWH)
	237-	Screws (Misc.)
	240-	Nuts (Misc.)
	242-	Washers (Flat, Round)
	244-	Washers (Split Lock)
	246-	Washers (Lockers, External Tooth)
V.	**MECHANICAL COMPONENTS**	
	249-	Rivets
	251-	Pins (Dowel)
	254-	Stand-Offs, Spacers and Shims
	260-	Steel Ball
	265-	Springs (Extension)
	266-	Springs (Compression)
	269-	Springs (Washers - Belleville, Wave)
	280-	Grommets and Bushing
VI.	**HANDLES, LOCKS, CATCHES & LATCHES, KEYS & HINGES**	
	355-	Handles, Locks, Catches & Latches and Keys
	390-	Hinges
VII.	**FABRICATED PARTS (IN-HOUSE ASSEMBLIES)**	
	500-	End Product (Systems and Models)
	515-	Sub-Assemblies
	520-	Printed Circuit Boards (PCBs)
	522-	Display Glass
	525-	Wood Parts
	530-	Screw Machined Parts
	535-	Fabricated Parts
	545-	Molded (Extruded) Parts (Rubber Rings, Molded Plastic)
	550-	Molded (Inserts)
VIII.	**BULK MATERIALS**	
	600-	Braided Ground Wire
	601-	Stranded Wire
	602-	Ribbon Cable
	605-	Sleeving (Shrink Tubing)
	626-	Foam Rubber
IX.	**MISCELLANEOUS**	
	705-	Packing & Shipping Items
	820-	Decals and Labels (Sets & Misc.)
	830-	Butyrate (Plastic Pieces)
	900-	Game Posters
	960-	EPROM (Raw Part)
	965-	EPROM (Programmed Part)



APPENDIX H
Playfield Inserts (Plastic Light Covers)

Patterns: STARBURST STIPPLE 	STARBURST CIRCULAR 5/8" ø 550-5000-XX	STARBURST CIRCULAR 3/4" ø 550-5001-XX	STARBURST CIRCULAR 1" ø 550-5002-XX	STARBURST CIRCULAR  1-3/16" ø 550-5003-XX	STARBURST CIRCULAR  1-1/2" ø 550-5004-XX
STARBURST CIRCULAR  2-1/4" ø 550-5005-XX	STARBURST CIRCULAR  2-3/4" ø 550-5006-XX	PLAIN CIRCULAR 3/4" ø 550-5007-XX	PLAIN CIRCULAR 1" ø 550-5008-XX	PLAIN CIRCULAR 1-3/16" ø 550-5009-XX	PLAIN CIRCULAR  1-1/2" ø 550-5010-XX
PLAIN CIRCULAR  2-1/4" ø 550-5011-XX	PLAIN CIRCULAR  2-3/4" ø 550-5012-XX	STIPPLE CIRCULAR 1" ø 550-5048-XX	STIPPLE 1" SQUARE 1" 550-5019-XX	ROLLOVER BUTTON BASE 550-5026-XX	WHITE STAR *(only in white)* 545-5015-00
STIPPLE RECTANGULAR  1-1/2" X 3/4" 550-5018-XX	STIPPLE RECTANGULAR  1-1/4" X 1-1/2" 550-5051-XX	STARBURST RECTANGULAR  2-1/4" X 1-1/8" 550-5044-XX	PLAIN RECTANGULAR  2-1/4" X 1-1/8" 550-5049-XX	PLAIN RECTANGULAR  1-1/4" X 1-1/2" 550-5050-XX	PLAIN RECTANGULAR  2" X 2-1/2" 550-5063-XX
STARBURST MINI SHIELD 1" X 1" 550-5024-XX	STARBURST LARGE SHIELD  2-1/5" X 2" 550-5025-XX	MINI HOT DOG  1-5/8" 550-5020-XX	BEVEL HOT DOG  3-1/2" 550-5021-XX	PLAIN HOT DOG  3-1/2" 550-5022-XX	BANANA 550-5023-XX
STARBURST ARROW-SMALL 550-5013-XX	STARBURST ARROW-LARGE 550-5070-XX	STARBURST ARROW-HEAD SMALL  550-5014-XX	STARBURST ARROW-HEAD 550-5015-XX	STARBURST BULLET 550-5016-XX	STARBURST TRIANGLE 550-5017-XX

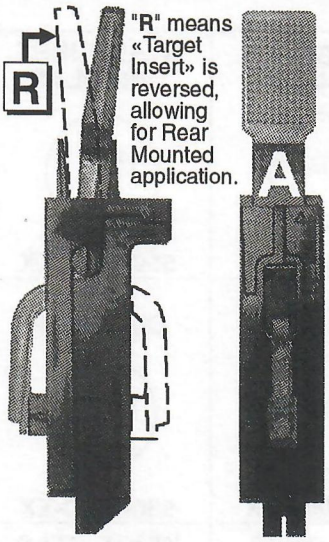
Note: The shapes and sizes shown above are not to scale. Some shapes may no longer be available in every color.

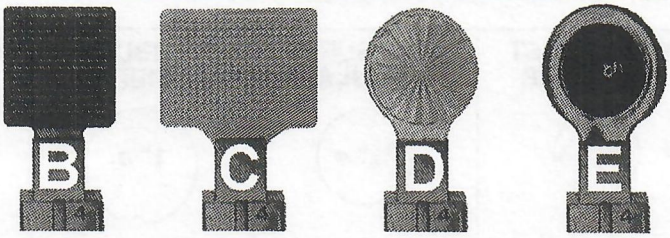
Instructions: Parts which may come in various colors (i.e. targets, some posts, playfield inserts, etc.) end in a 2-digit Nº which correspond to the color of that part. The "-XX" in Part Nºs which may come in various colors should be replaced with the desired 2-Digit Nº. corresponding to the color desired. *Not all colors may be available.*

PLASTIC PART COLOR CHART

Nº	Color	Nº	Color	Nº	Color	Nº	Color	Nº	Color	Nº	Color
-00	**Black** or Solid Clear	-03	Amber	-06	Yellow	-09	Purple	-12	Fluor. Blue	-15	Luminescent
-01	Clear	-04	Green	-07	Orange	-10	Fluor. Orange	-13	Teal Green	-16	Gold
-02	Red	-05	Blue	-08	White	-11	Fluor. Green	-14	Gray	-17	Trans. Brown

APPENDIX I
Stand-Up Targets



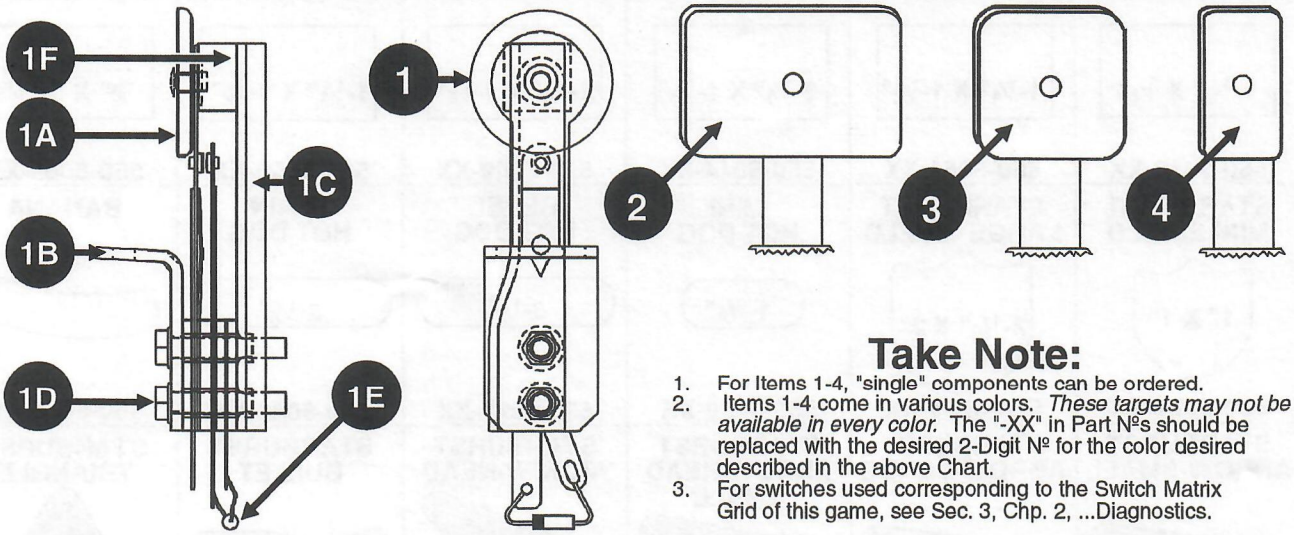


PLASTIC PART COLOR CHART	
№	Color
-00	Black
-01	Clear
-02	Red
-03	Amber
-04	Green
-05	Blue
-06	Yellow
-07	Orange
-08	White
-09	Purple
-10	Fluor. Orange
-11	Fluor. Green
-12	Fluor. Blue
-13	Teal Green
-14	Gray
-15	Luminescent
-16	Gold

Take Note:

1. For **Items A-E**, for the Target Assembly use the **"500-"** SPI №; For the Target Assy. with Rear Mount add **"R"** to **"500-"** SPI №; For just the «Target Insert» use the **"545-"** SPI №.
2. **Items A-E** come in various colors. *These targets may not be available in every color.* The **"-XX"** in should be replaced with the desired 2-Digit № for the color desired described in the Chart ↗.
   As of date of print, the following colors were used for Items A-E:
   -01 Clear **(A, D)**; **-02** Red **(A, B, C, D, E)**; **-03** Amber **(D, E)**; **-04** Green **(A, B)**; **-05** Blue **(C)**; **-06** Yellow **(A, C)**, **-09** Purple **(B, D)**; **-11** Fluorescent Green **(A, B, D)**.
3. See Section 3, Chapter 2, Go To Diagnostics Menu, for switches used corresponding to the Switch Matrix Grid of this game.

№	Stand-Up Target Name	Part №	№	Stand-Up Target Name	Part №
A	Modular Stand-Up Target Narrow Assy.	500-6138-XX	D	Modular Stand-Up Target Round Assy.	500-6075-XX
	Stand-Up Target Narrow (Insert)	545-6138-XX		Stand-Up Target Round (Insert)	545-6075-XX
B	Modular Stand-Up Target Square Assy.	500-6139-XX	E	Mod. Stand-Up Target 1" Spherical Assy.	500-6189-XX
	Stand-Up Target Square (Insert)	545-6139-XX		Stand-Up Target 1" Spherical (Insert)	545-6189-XX
C	Modular Stand-Up Target Rectangle Assy.	500-6228-XX	***NOTE:*** To receive the Target Assy. with the « Target Insert » « Reversed » simply add a **"R"** at the end of the Part №. See Side View picture above to compare (dashed line shows target reversed).		
	Stand-Up Target Rectangle (Insert)	545-6228-XX			



Take Note:

1. For Items 1-4, "single" components can be ordered.
2. Items 1-4 come in various colors. *These targets may not be available in every color.* The "-XX" in Part №s should be replaced with the desired 2-Digit № for the color desired described in the above Chart.
3. For switches used corresponding to the Switch Matrix Grid of this game, see Sec. 3, Chp. 2, ...Diagnostics.

№	Stand-Up (Flat) Target Name	Part №
1	1" Round Stand-Up Target Assy.	500-5835-XX
ORDERING ABOVE (ITEM 1) ASSY. PART № WILL INCLUDE:		
1A‡	Switch & Target Assy. 1" Round	515-5966-XX
1B	Mounting Bracket	535-6896-00
1C	Switch Back Plate	535-6452-00
1D	6-32 X ¾ HWH Swage (Qty. 2)	237-5976-05
1E	Switch Diode, 1N4001	112-5001-00
1F	Foam Pad	626-5029-00

‡ Note: Item 1A, is a riveted Sub-Assy. which includes the following items for reference: A1— Stack Switch Radius End (180-5133-00), A2— Washer 5/16" (242-5017-00), A3— Rivet 1/8" ø X 3/16" (249-5001-00) and A4— 1" Round Target (545-5456-XX).

2	1" X 1½" Stand-Up Rect. Target Assy.	500-5321-XX
ORDERING ABOVE (ITEM 2) ASSY. PART № WILL INCLUDE:		
2A‡	Sw. & Target Assy. 1" X 1½" Rect. Items 2B-F are identical to 1B-F	515-6027-XX Same as 1B-F

Item 2 Table Note continued in the next column.

№	Stand-Up (Flat) Target Name	Part №

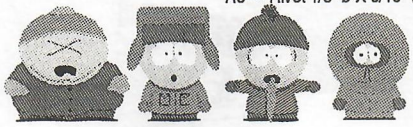
‡ Note: Item 2A, is a riveted Sub-Assy. which includes the following items for reference: A1— Stack Switch Radius End (180-5133-00), A2— Washer 5/16" (242-5017-00), A3— Rivet 1/8" ø X 3/16" (249-5001-00) and A4— Rectangular Target (545-5145-XX).

3	1" Sq. Stand-Up Target Assy.	500-5232-XX
ORDERING ABOVE (ITEM 3) ASSY. PART № WILL INCLUDE:		
3A‡	Sw. & Target Assy. 1" Square Items 3B-F are identical to 1B-F	515-5162-XX Same as 1B-F

‡ Note: Item 3A, is a riveted Sub-Assy. which includes the following items for reference: A1— Stack Switch Radius End (180-5133-00), A2— Washer 5/16" (242-5017-00), A3— Rivet 1/8" ø X 3/16" (249-5001-00) and A4— 1" Square Target (545-5470-XX).

4	Narrow Stand-Up Target Assy.	500-5835-XX
ORDERING ABOVE (ITEM 4) ASSY. PART № WILL INCLUDE:		
4A‡	Sw. & Target Assy. Narrow Items 4B-F are identical to 1B-F	515-5967-XX Same as 1B-F

‡ Note: Item 4A, is a riveted Sub-Assy. which includes the following items for reference: A1— Stack Switch Square End (180-5132-00), A2— Washer 5/16" (242-5017-00), A3— Rivet 1/8" ø X 3/16" (249-5001-00) and A4— Narrow Target (545-5210-XX).



GLOSSARY OF TERMS

A Followed after a number means "Amp." or Ampage in an expression relating to an electrical object. (e.g. 8**A**).

AC (Acronym) **A**lternating **C**urrent.

Adj. (Abbreviation) Adjustment(s).

Assy. (Abbreviation) Assembly.

Au. (Abbreviation) Audit(s).

Bd. (Abbreviation) Board.

BOT (Abbreviation) Bottom.

Brkt. (Abbreviation) Bracket.

Bridge Rectifier A configuration of a diode that allows current to flow in one direction producing both positive and negative pulsating DC Voltages.

Color Coding See Appendix H or I, Plastic Part Color Chart or Section 4, Chapter 1, Playfield - Plastic Posts & Spacers.

Combination (Combo) [Shot] Any variable pinball shot(s) made successively.

Conn. (Abbreviation) Connector.

CMOS Short for COSMOS (Complementary Symmetry M.O.S.); Complementary Metal-Oxide Semi-Conductor.

CN (Abbreviation) Connector (e.g. **CN**5-P3).

CT (Abbreviation) Center.

DC (Abbreviation) Direct Current.

DT (Abbreviation) Drop Target(s).

DOTS (Acronym) **D**iode **O**n **T**erminal **S**trip.

EB (Abbreviation) Extra Ball.

Eject Playfield surface device to kick ball back into play; Saucer.

EPROM (Acronym) **E**rasable **P**rogrammable **R**ead **O**nly **M**emory. Can be erased using UV Light and re-programmed.

e.g. (Abbreviation) Latin- Exempli gratia. For Example.

EOS (Acronym) **E**nd-**O**f-**S**troke (i.e. Switch for flipper).

F (Abbreviation) Fuse (i.e. F23).

GA-Turn Gauge & Turn describing the windings on a coil (e.g. 23-800, 23 is the gauge of wire and 800 is the amount of windings.

G.I. (Abbreviation) General Illumination (Lamps).

HWH (Abbreviation) Hex Washer Head.

IC (Acronym) **I**ntegrated **C**ircuit (As in after 24-Pin IC).

ID or I.D. (Acronym) **I**nside **D**imension.

i.e. (Abbreviation) Latin- Id est. That is.

IO or I/O (Abbreviation) Input / Output (e.g. I/O Power Driver Bd.)

LT, Lt. or L. (Abbreviation) Left.

Laser Kick A coil/plunger used above the playfield to kick pinball back into play.

LED (Acronym) **L**ight **E**mitting **D**iode.

Loop [Shot] Continuously up a ramp and back to the flipper.

Lwr. (Abbreviation) Lower.

Orbit [Shot] From the left or right flipper around the back rail of the playfield back to the flipper.

MB (Abbreviation) Magnet Board.

M-BALL or MBALL (Abbreviation) Multiball™ More than 1 ball in game play.

MID (Abbreviation) Middle

Non-Reflexive See Reflexive.

No. or Nº or # (Abbreviation) Number

NPF (Acronym) **N**o **P**roblem **F**ound.

N.C. or NC (Abbreviation) Normally Closed.

N.O. or NO (Abbreviation) Normally Open.

NS (Abbreviation) Not Stuffed. (Use in Part Listings, Sec. 5)

OD or O.D. (Abbreviation) Outside Dimension.

P (Abbreviation) Pin (e.g. CN5-**P**3).

PCB (Acronym) **P**rinted **C**ircuit **B**oard

P/F (Abbreviation) Playfield.

PIA LED (Acronym) **P**eripheral **I**nterface **A**dapter **L**ight **E**mitting **D**iode.. This is a diagnostic LED on the CPU; it should not be lit during normal operation of a pinball game.

Plumb Bob Tilt Weight on Tilt Assembly.

PPH (Abbreviation) Phillips Pan Head.

Pop(s) Another term for Turbo Bumper(s).

PPB (Acronym) Playfield Power Board ("Popcorn-Popping Bd.").

PREV (Abbreviation) Previous.

PSB (Abbreviation) Power Supply Board

RAM (Acronym) **R**andom **A**ccess **M**emory. RAM **can** store input instructions and supply output information.

Reflexive/Non-Reflexive **Reflexive**—Solenoid Drive Transistor is enabled directly by a switch closure on the (Relating to CPU Boards) solenoid assembly (Ver. 1/2).
Non-Reflexive—Solenoid Drive Transistor is enabled by the CPU after reading a switch closure in the Switch Matrix (Ver. 3). Also note: All CPU Boards are backwards compatible (e.g. Jurassic Park/Ver. 3 to Time Machine/ Ver. 2). Swapping a Ver. 2 Board to a Ver. 3 is not possible due to the special solenoids section (i.e. Slingshots, Turbo Bumpers, etc.) changing from ***REFLEXIVE*** to ***NON-REFLEXIVE*** on Ver. 3 Boards.

Relay An automatic switch operated by current in a coil.

ROM (Acronym) **R**ead **O**nly **M**emory. ROM **cannot** store input instructions but can supply output information. ROM can be programmed only once.

RMA (Abbreviation) Return Merchandise Authorization Number

RT, Rt. or R. (Abbreviation) Right; ("**R**" at the end of Target Assy. Part Nº signifies Target Insert is **R**eversed.)

RO (Abbreviation) Rollover (switches).

Saucer See Eject.

Scoop A hole into the playfield. A metal scoop is in place to guide the ball into the kick-back under the playfield.

Slam Tilt A switch which closes when the game is slammed into or the Coin Door is slammed shut. Depending on adjustable settings, will cancel game in play when the number of closures required is achieved.

SMB (Abbreviation) Shaker Motor Board.

Solenoid A coil used for Electro Magnetic devices such as relays, flippers, slingshots, etc.

SSFB (Abbreviation) Solid State Flipper Board.

STEP Refers to the service switches on the coin door.

Sub-Assy. (Abbreviation) Sub-Assembly.

S-U or S/U (Abbreviation) Stand-Up (targets).

TM (Abbreviation) Trademark

Transfer [Shot] Maneuvering the ball in play from one flipper to the other. With flipper in the up position and the ball cradled by that flipper one would activate the flipper button in a quick repetitive manner to bounce the ball to the other side. Skilled players can rebound the ball off the slingshot.

Tri-Ball Three balls in play.

TTL (Abbreviation) Transistor-Transistor Logic

Upr. (Abbreviation) Upper.

V or v (Abbreviation) Volt(s).

Ver. (Abbreviation) Version.

VUK (Acronym) **V**ertical **U**p-**K**icker (Super or Standard).

X (Abbreviation) "Times" A multiplier; also used in dimensions.

X-Ball An undetermined number of ball(s) during game play.

Zener Diode A semi-conductor diode used for voltage regulation. Application depends on reverse break-down voltage.

"-00B" "B" at the end of Coil Part Numbers signifies that the diode is attached to the bottom of the lug.

"-00T" "T" at the end of Coil Part Numbers signifies that the diode is attached to the top of the lug (the side nearest the coil-winding).

Parts Order Checklist Notes

Date Ordered	Part №	Qty.	Description	Date Received

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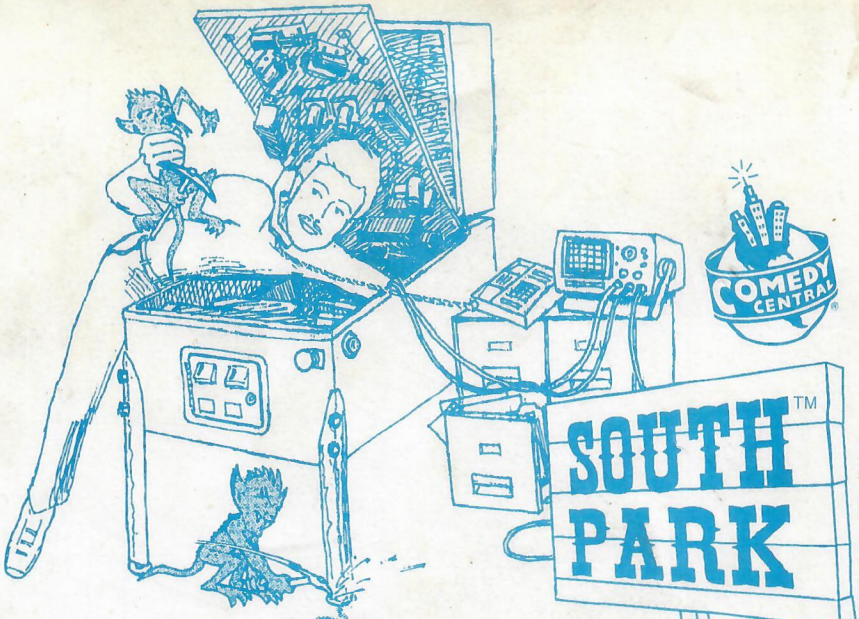

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